APRIL 13, 1953

American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

Angular layout eases stock handling — see page 2

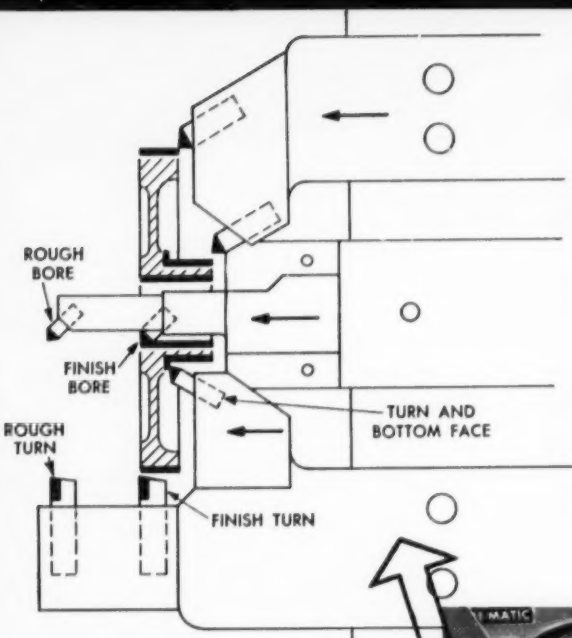
How Sylvania Fashions Fluorescent Fixtures — Presswork, Painting, Assembly — A SPECIAL REPORT

multiple surfaces get the

ALL-OVER

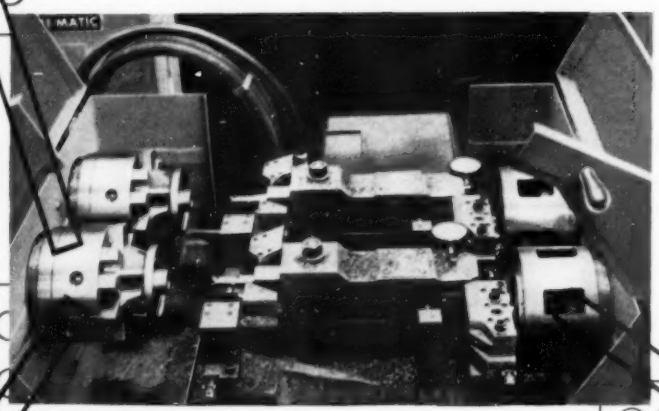
borizing treatment

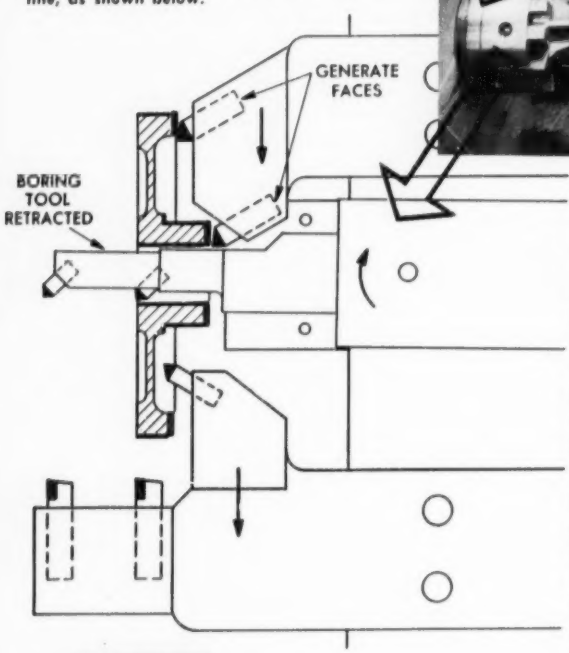
Model 222 Bore-Matic precision finishes helical gear blanks on all contact surfaces in continuous-production setup



1st Operation, left end stations: load, table rapid traverses left, slows to rough bore and turn, then slows further to finish bore, turn and bottom face, as shown above.

2nd Operation, left end stations: contact switch starts cross-slide forward to generate face of part, automatically shifting bridged-over dial-bar boring tool to eliminate drag line, as shown below.

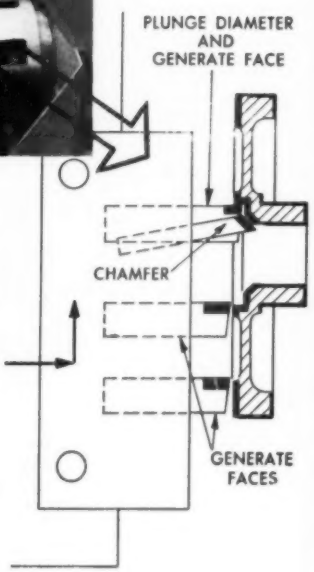




With the tooling arrangement shown above, this four-station, double-end machine turns out precision borized cast iron gear blanks two at a time — with no time out for loading and unloading.

Each blank is bored, faced, turned and chamfered on a total of eleven surfaces. Parts are bored, turned and faced on flange end at the two left-hand stations, both 1st and 2nd operations being done at each station. Then parts are transferred to the right-hand stations for the remaining operations. The operator is able to load one end while the other end is borizing, eliminating handling time from the work cycle. The machine cycle and sequence of operations are illustrated in the accompanying diagrams.

Remember—when it comes to precision finishing, it pays to come to Heald.



For final operation on right end of machine, table rapid traverses right and cross slide indexes to rear to finish two faces and a chamfer, as shown above.

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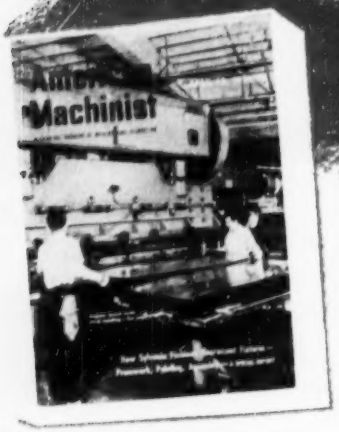

Angle Set . . . Our cover photo, taken at the Wheeling, W Va, plant of Sylvania Electric Products, shows further extension of a familiar idea in screw-machine departments. All the presses, instead of being aligned with, or perpendicular to, the aisles, are "angleparked" for convenience in stock handling. This is just one of a number of ideas we picked up to pass along to you in a recent camera trip with Jim Burns. The rest comes to you in our current 20-page Special Report. It contrasts sharply with earlier similar reports in that presswork, painting, and assembly are the subjects, rather than tooling and machining, is also a real "scoop" in that this is the first time the highly competitive business of fixture making has been reported upon. What's more, this is the biggest fluorescent-fixture plant. It has its own auxiliary gas supply, and reportedly has belt-driven sump pumps and a rowboat in the cellar just in case the "Beautiful Ohio" decides to come in. We wouldn't know; our time was spent studying working areas and talking with very-cooperative operators and department heads.

Administration . . . Three articles in this issue—all short—will give executives something to think about . . . First there's the story of Allis-Chalmers eye-protection program, begun in 1948. Accident frequency in one group with glasses dropped 19%, raised 19% in another group without . . . H M Coverdale of Douglas Aircraft (Santa Monica — see biog) explains their method of giving foremen a better understanding of problems of labor productivity . . . Third is a story on a company made up of handicapped people, and competing very successfully.

Tooling . . . In addition to the Sylvania and Thor stories we have a 3-pager showing tooling adapted for handicapped workers in a new plant . . . There's also a spread of Shop Shots, mostly on sheet-metal fabrication, the most interesting a gadget that radiums edges a sheet as it enters a Yoder mill, thus eliminating hand deburring.

Cutting Oils . . . What the shopman should know about cutting fluids and a unique article on making your own cutting oils are both in this issue. The second one includes a roundup of opinion which you'll find unusually interesting . . . We've added the latest on grinding carbides, too — how Boeing adapted its dry grinders for cutting fluid and thus conserved diamonds.

New Metals . . . Recently, one of our associate editors visited Dr Paul Schwarzkopf in his Yonkers laboratory, came away with some suggestions about things to come. There's the story of how a jet-turbine rotor is machined, complete with blades, from "green" titanium-carbide. There's also something about new boride tool metals, and the theory of high-temperature alloys.

Thor Helps Mars . . . Recently, Thor turned out its millionth 105-mm shell. Associate Editor Ben Brosheer chose the occasion to photograph the things in the process that are new and different. We bring you the pictures in a current 5-page article. The company went from vacant plant to fully conveyorized production in six months.

Shearing $$ . . . Donald D Amison, of Brown & Sharpe Mfg Co, shows how, in tables, to shear two standard-size steel sheets into blanks with least shearing waste or trim scrap, and to determine the gross weight of fabricated parts. An advantage of this system is reduction in sizes of sheets stocked and handled. The charts show the most economical sheet for any size of blank.

Coming . . . April 27 *AM* will feature operations at the Michoud tank-engine plant operated by Chrysler for Ordnance. There'll be articles on heated dies for magnesium, on buying tool designs from competitive bids, on carbide cold-heading dies, on X-ray fluorescent analysis, and a sum-up on grinding carbides with SiC.

COAST MAN . . . H M Coverdale, production-cost coordinator in sheet-metal fabrication at Douglas Aircraft Company's Santa Monica Division, was born in Boston 33 years ago, but was brought up in British Columbia. He was a machine-shop helper at Consolidated Mining & Smelting of Canada during high-school vacations, and from 1947 to 1950 was a design engineer there and next to the supt of engrg services. But he got his BAS in ME from the U of British Columbia in 1943 and his MSME from MIT in 1947. During World War II he was in the Royal Canadian Navy, serving, as an engineer officer for 32 months and attending the Royal Naval Engrg College in England to specialize in aircraft maintenance. During 1945-46, he was senior engineer on maintenance of trans-Atlantic service for TCA and a liaison engineer on conversions. He has been with Douglas for 2½ years. He has been assigned to sheet-metal fabrications for the past year, and authors an article in this issue on this work.

ONE CUT
FROM THE SOLID
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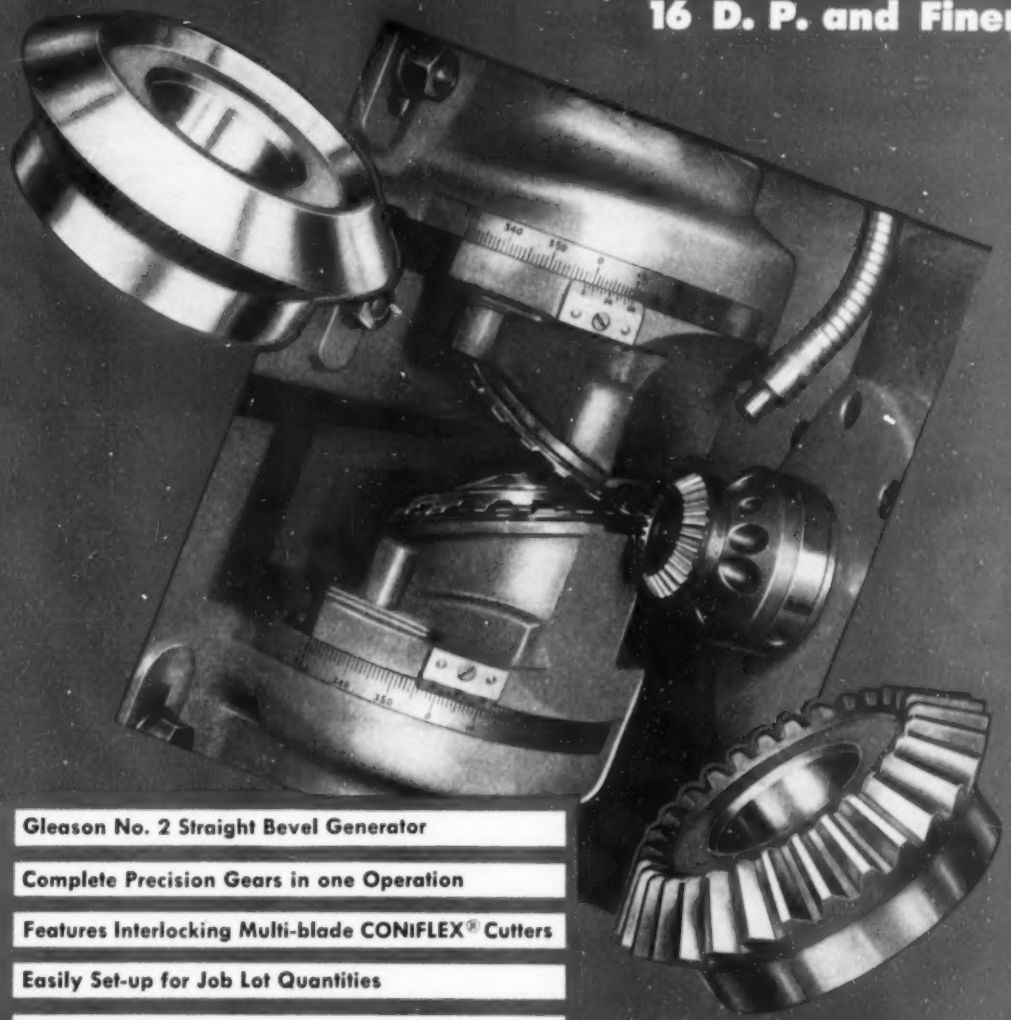

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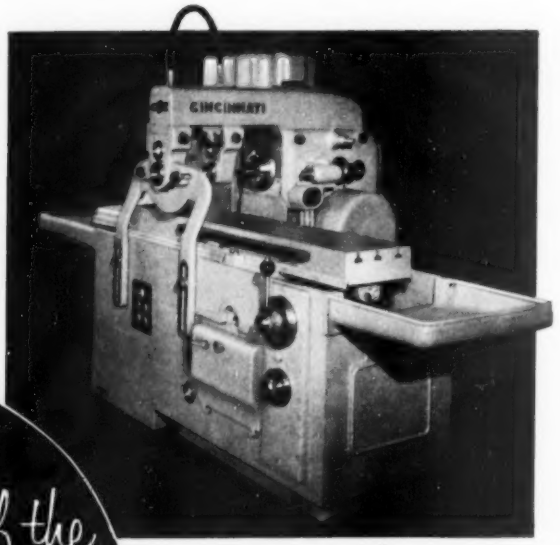

three styles of the

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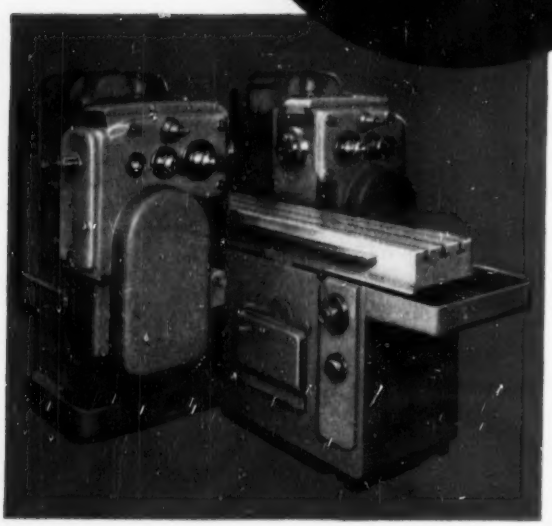
Plain style, CINCINNATI No. 2-24 Automatic Milling Machine.



Duplex style, CINCINNATI No. 2-24 Automatic Milling Machine.

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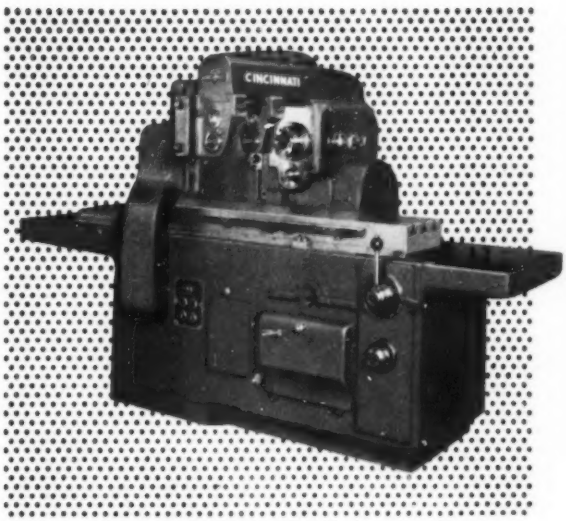

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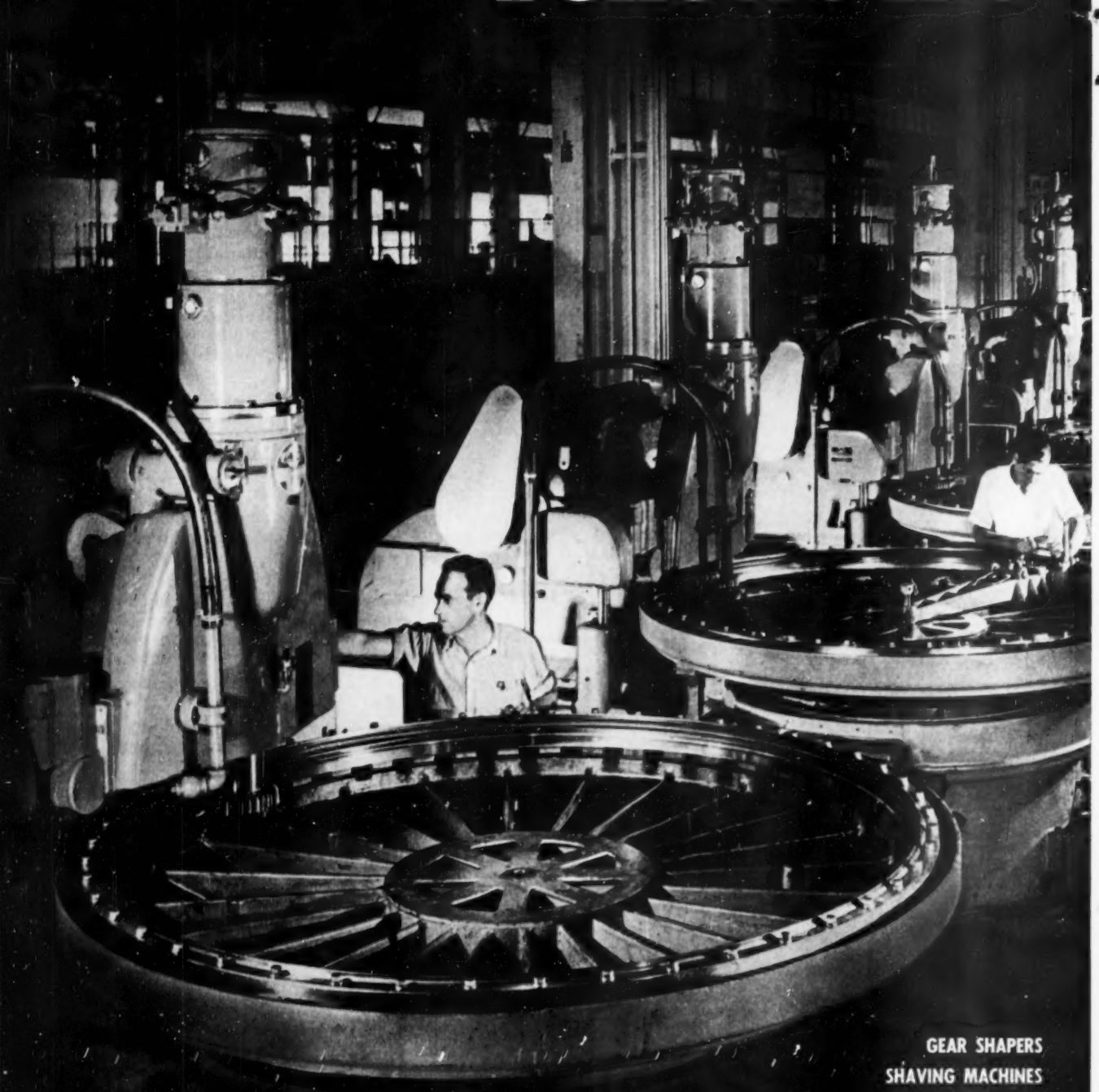

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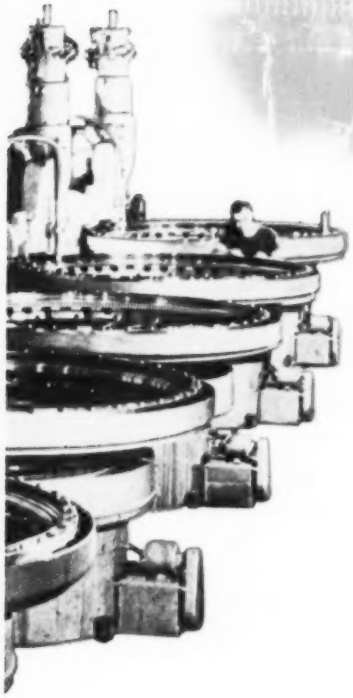

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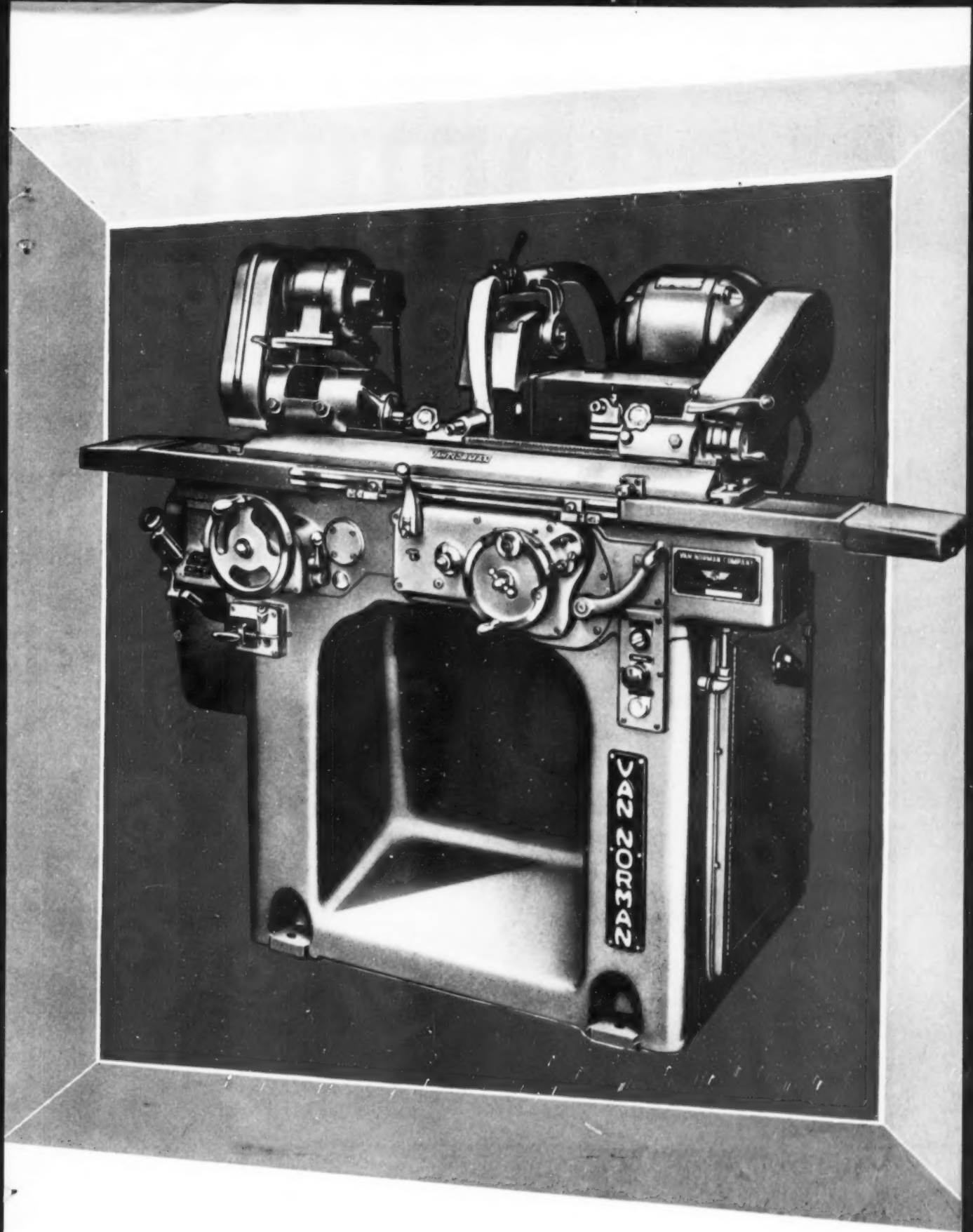
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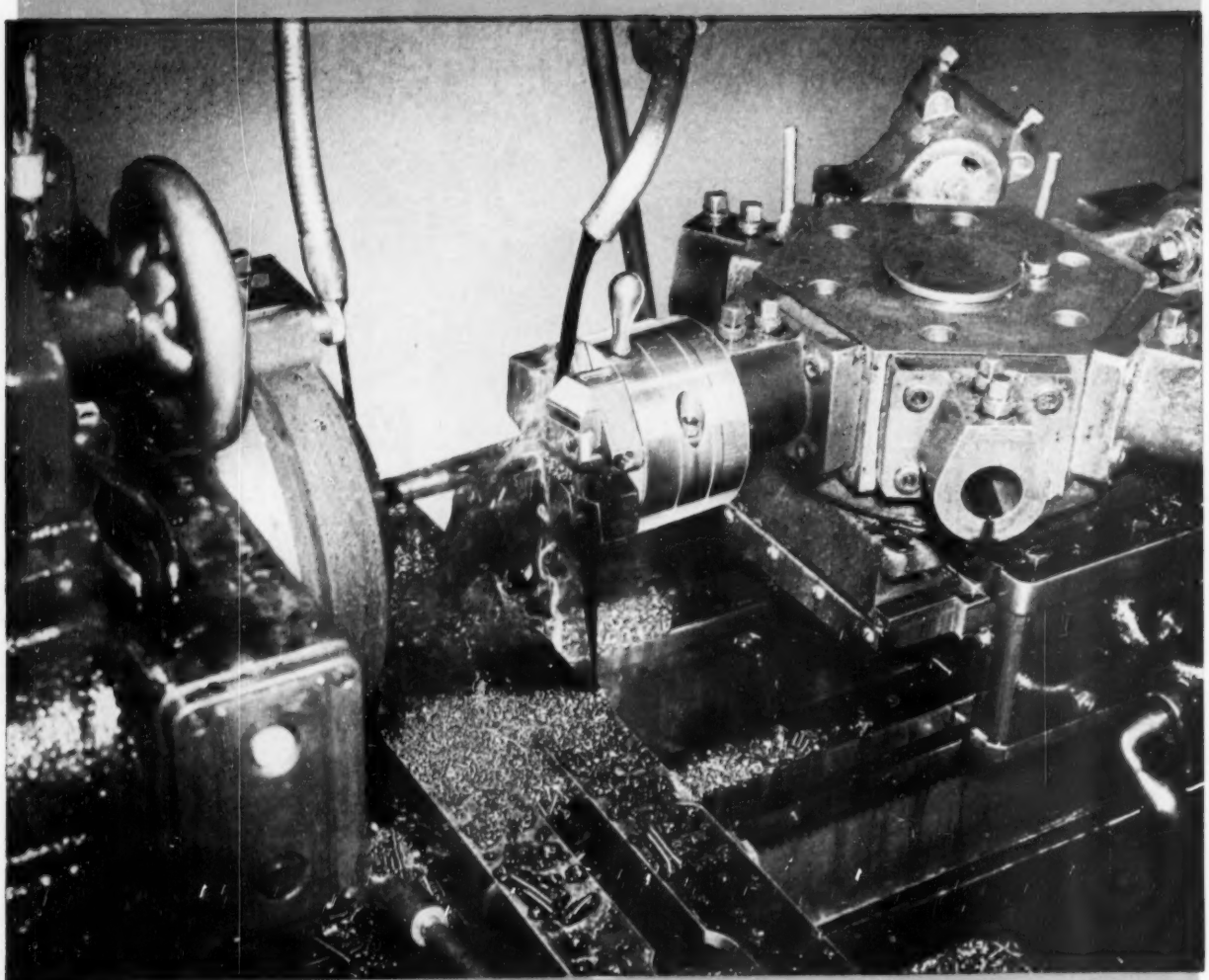

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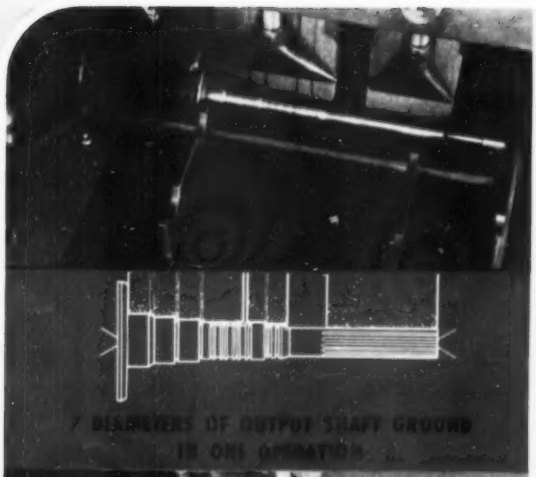
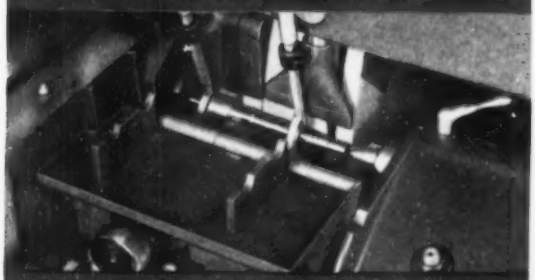
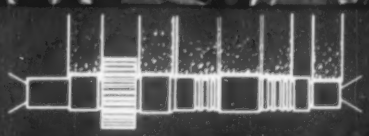


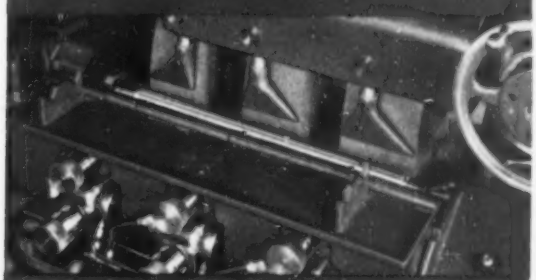
7 DIAMETERS OF OUTPUT SHAFT GROUND IN ONE OPERATION

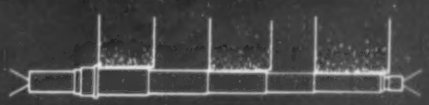
9 LINE BEARINGS GROUND IN ONE OPERATION





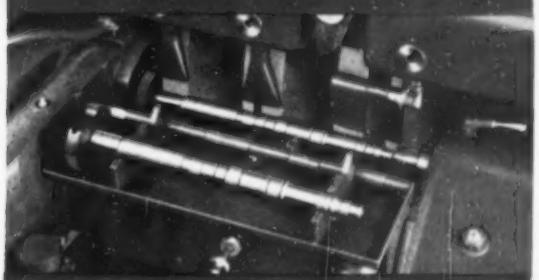
6 DIAMETERS OF FORWARD SUN GEAR GROUND IN ONE OPERATION

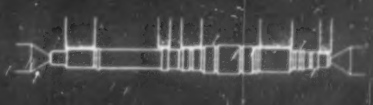




3 DIAMETERS OF COMPRESSOR SHAFT GROUND IN ONE OPERATION

6 MAIN BEARINGS AND 1 OIL SEAL ON CRANKSHAFT GROUND IN ONE OPERATION





5 DIAMETERS OF SHAFT GROUND IN ONE OPERATION

LANDIS TOOL COMPANY • WAYNESBORO, PENNSYLVANIA, U. S. A.

This high-priority job demands

Three G&L 340-T machines speed precision drilling and milling of jet compressor castings . . . position automatically to within tenths of a .001"

THOUGH complete production data must be withheld for security reasons, A. V. Roe Canada, Ltd., reports three G&L Horizontal Boring, Drilling and Milling machines are making an important contribution toward increased production of the Orenda jet engine.

These machines are equipped with the G&L automatic electric positioning device. This outstanding feature allows fast positioning of the casting accurate to within tenths of .001".

Like A. V. Roe, you too will find that for your work . . . big or small . . . simple or complex . . . you'll save time and money with the G&L line. Maybe you'll want a G&L Horizontal Boring, Drilling and Milling machine—or a G&L Hypro Planer, Planer-Miller or Vertical Boring Mill. But what-

GIDDINGS & LEWIS

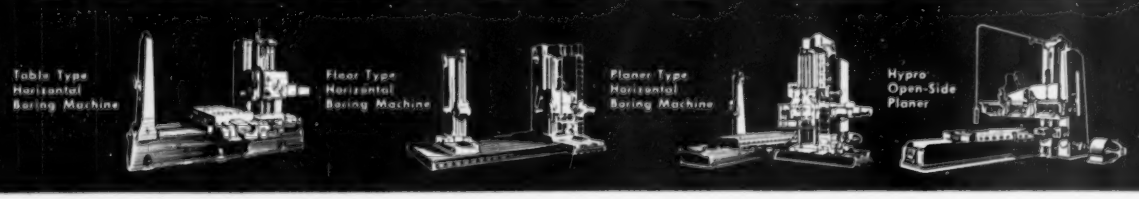
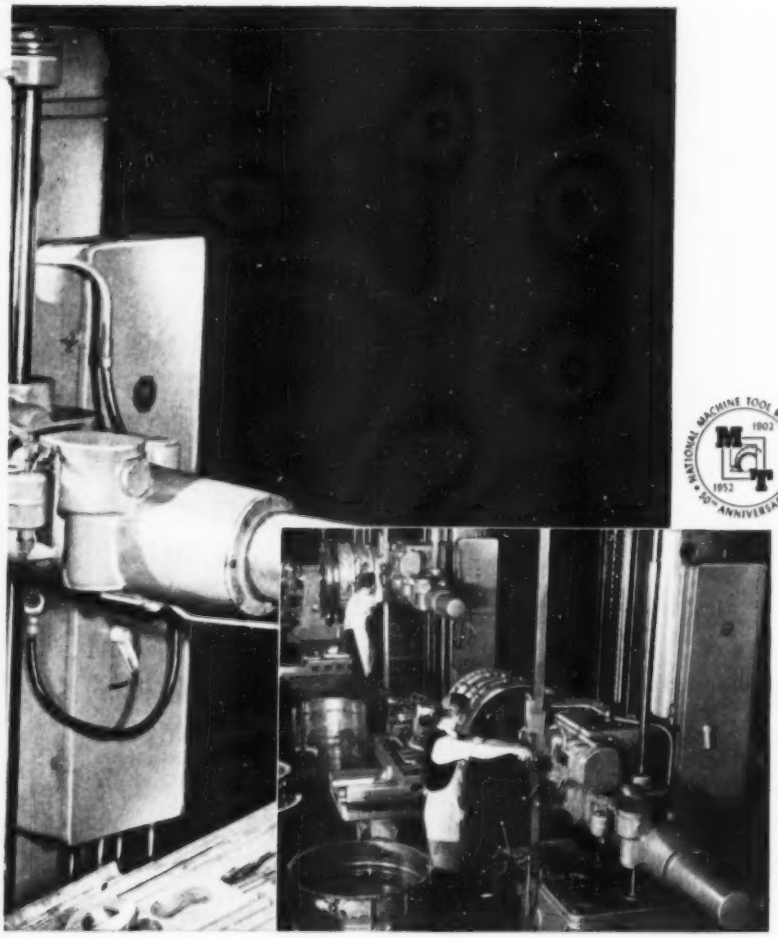


Table Type Horizontal Boring Machine
Floor Type Horizontal Boring Machine
Planer Type Horizontal Boring Machine
Hypro Open-Side Planer

extra-close tolerances



Photos show G&L 340-T's working on jet compressor castings. Note small revolving table mounted on standard table which speeds positioning.

ever your need, you can be sure that G&L's unbiased Job Analysis Service will give you an answer that will mean savings. See our nearest representative or write direct. Get the facts about G&L Job Analysis today. There's no obligation . . . and DELIVERY ON G&L MACHINES MIGHT BE BETTER THAN YOU THINK!

G&L 5-POINT JOB ANALYSIS

takes the guesswork out of machine tool buying . . works for you and with you to solve big or complex machining problems..increases production . . reduces machining costs

1 **COMPLETE STUDY OF YOUR JOB OR JOBS** — G&L Job Analysis Engineers, working with your engineers, analyze your requirements by: (1) number and size of parts to be produced (2) number and kind of operations needed (3) tolerances and finishes required.

2 **DETERMINE MOST EFFICIENT MACHINING METHOD** — Taking into consideration the individual machining requirements of the job, G&L Job Analysis Engineers choose the most efficient machining method. G&L engineers can give an unbiased opinion because G&L builds a complete line of sizes and types of planers, planer-millers, vertical boring and turning mills and horizontal boring, drilling and milling machines . . . plus a complete line of accessories and tooling for these machines.

3 **SELECT THE SIZE, KIND AND TYPE OF MACHINE** — The machining method now determined, G&L Job Analysis Engineers — using your production and work requirements — recommend the exact size, kind and type of machine that will do the job most efficiently.

4 **PLAN YOUR OPERATIONS** — After the selection of the most efficient machine to fit your needs, G&L Job Analysis Engineers plan a sequence of operations that will (1) minimize number of setups and setup time, (2) use modern cutting tools to best advantage, (3) take full advantage of the machine working ranges and capacities, (4) keep operator fatigue to a minimum.

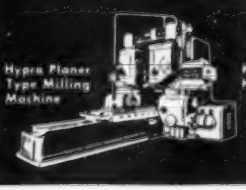
5 **RECOMMEND (AND DESIGN IF NECESSARY) THE TOOLS TO USE** — If conditions warrant, G&L will recommend the standard machine accessories, arrangements and tools you can use to make your equipment more productive—more versatile in application. If special equipment is needed, it will be designed to agreed specifications and made a part of your order.

Write, wire or phone G&L or its nearest representative today. Get the facts on your needs — your problems. Get a G&L unbiased Job Analysis to help you. Don't hesitate — there's no obligation . . . AND DELIVERY MAY BE BETTER THAN YOU THINK!

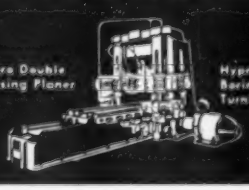
How to get a G&L job analysis

Call your nearest G&L dealer or write us direct. Furnish our Job Analysis Engineers with blueprints, job data, and production requirements. Factory engineers will completely analyze your machining problems. There's no charge, no obligation. Don't hesitate — do it today.

MACHINE TOOL CO.



Hypro Planer Type Milling Machine

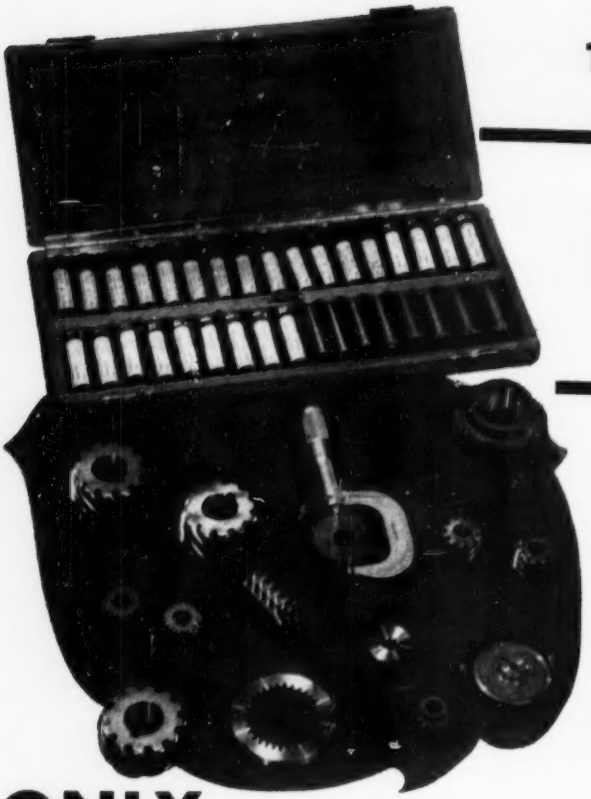


Hypro Double Housing Planer

Hypro Vertical Boring and Turning Mill

G&L HYPRO

FOND DU LAC WISCONSIN



THE *Van Keuren* GEAR MEASURING SYSTEM

Set 26EX—Gear Measuring Wires, accurate to ± .000025", for common diametral pitch external spur gears.

VAN KEUREN GEAR MEASURING WIRES PROVIDE THE MOST ACCURATE AND LOW COST METHOD OF MEASURING THE TOOTH THICKNESS OF SPUR AND HELICAL GEARS, INVOLUTE SPLINES AND INVOLUTE SERRATIONS.

ONLY... *EQUIPMENT NEEDED:*

1—SET VK MEASURING WIRES
1—MEASURING INSTRUMENT

Complete information regarding the use of Gear Measuring Wires is contained in a 50-page section of the Van Keuren CATALOG and HANDBOOK No. 35. Included in this section are:

- . . . table of wire sizes for the 1.92", 1.728", 1.68" and 1.44" series.
- . . . tables of wire measurement including change factors for standard external and internal spur gears of 14½°, 17½°, 20°, 25°, and 30° pressure angles and of from 5 to 500 teeth.
- . . . table of relationships between depth of cut and tooth thickness for common pressure angle gears.
- . . . definitions and exact formulas covering involute spur gears.
- . . . tables of involute tooth parts for standard addendum and stub tooth involute gears.
- . . . information, formulas and examples regarding the wire measurement of helical gears.
- . . . information and examples concerning the wire measurement of enlarged pinions and reduced gears.
- . . . tables of wire measurement for involute splines.
- . . . tables of wire measurement for involute serrations.
- . . . tables of comparative measurement over three sizes of wires for use in involute profile checking.

CATALOG and HANDBOOK No. 35 is available without charge by writing to: The Van Keuren Co., 173 Waltham St., Watertown, Mass. Ask for your copy.

VK
34th YEAR

THE *Van Keuren* CO.,

173 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires

92 hrs. of heat treatment

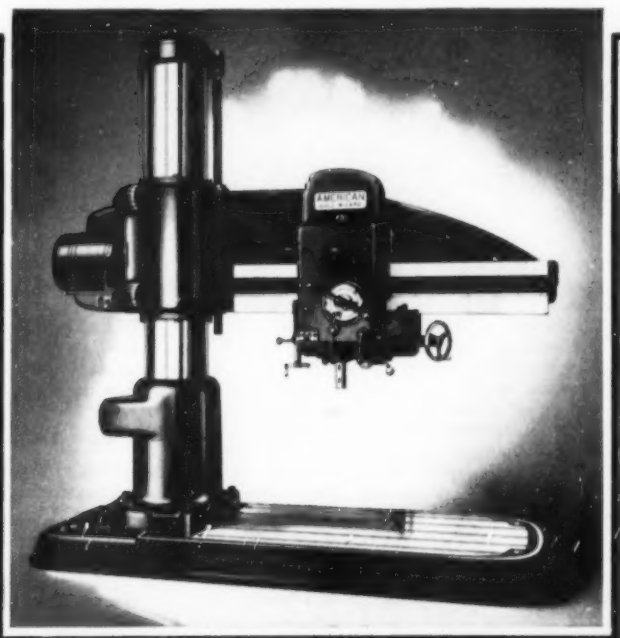
. . . required to produce the ultimate in radial drill spindles

"AMERICAN" Radial Drill Spindles are made of nitralloy. 20 hours of heat treatment from rough to finish, then 72 hours of nitriding are required to produce the wear-resistant spindles used in these radials.

Both the spindles and sleeves are nitrided to 110 degrees scleroscope. This is harder than some grades of cemented carbide. The sleeve is finish honed and the spindle ground and then diamond lapped to a sliding fit in the sleeve. Because of the lack of affinity between these two hard surfaces the clearance between them may be reduced to the very minimum, which in this case is .00025".

This results in the greatest possible stability, resulting in an ideal construction especially for accurate boring operations, which demand a high degree of smoothness and rigidity of the spindle.

This is but one of the super features that make the "AMERICAN" Hole Wizard an outstanding investment.



THE AMERICAN TOOL WORKS CO. **Cincinnati, Ohio U.S.A.**

Lathes and Radial Drills

The wheel head tilts!

The #20 cutter and tool grinder gives you the "TOUCH OF GOLD"

No other cutter and tool grinder does so many jobs so fast... so easily!

Featuring greatly increased versatility, the Norton No. 20 cutter and tool grinder brings new speed and economy to the widest range of tool and cutter grinding jobs. It brings you the "Touch of Gold", adds value to every piece of work it grinds . . . brings you more speed, more product value, more profit.

The wheel head can be tilted up to 15° above or below horizontal, and swivelled through 360° — simplifying such ordinarily difficult jobs as grinding taper reamers, step counterbores, form tools and milling cutters.

Other "Touch of Gold" advantages that make this Norton cutter and tool grinder easier to set up and more profitable to operate include: greater lengths of table traverse and wheel slide travel . . . integral motor spindle . . . centrally located column elevating hand wheel . . . wheel slide graduated dials readable from any position . . . automatically lubricated table ways . . . electric equipment built to Machine Tool Builders' standards . . . wheel spindle reversing switch (optional) for carbide grinding.

Only one of the world's most complete line of grinding machines, the No. 20 is a typical development of Norton's engineering leadership. *Remember — only Norton offers you such long experience in both grinding machines and wheels to help you produce more at lower cost.* This leadership is at your service for your present or "post emergency" problems.

Why not investigate how the No. 20 can modernize and speed up tool and cutter grinding in your plant? See your Norton Representative for detailed information — and ask him about Norton cutter and tool grinders Nos. 1 and 2, and the BURA-WAY Grinder for automatic lathe tools. Meanwhile, write direct for Catalog 189, NORTON COMPANY, MACHINE DIVISION, Worcester 6, Mass. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.

***To Economize Modernize With* NEW**

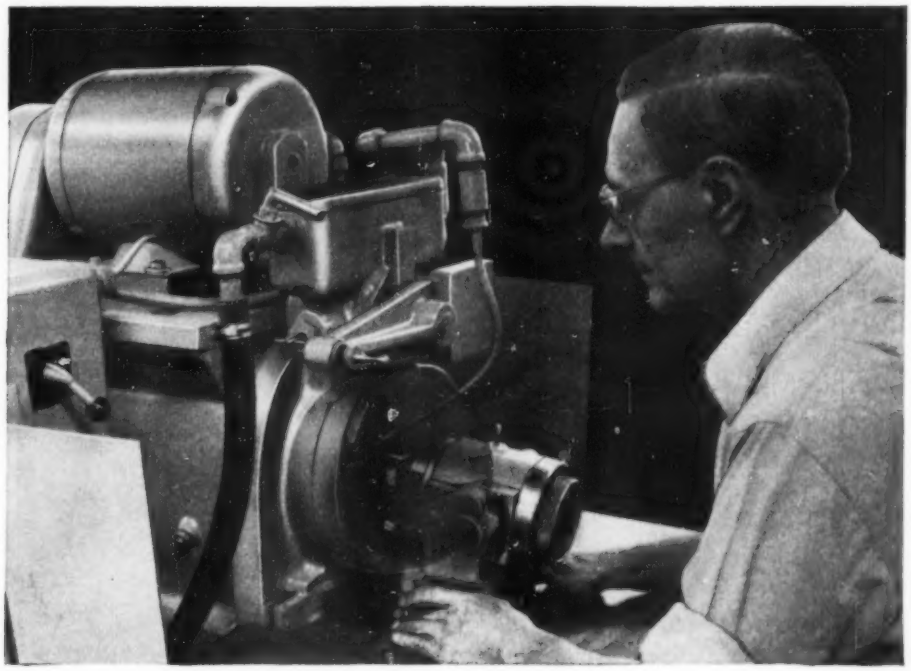
NORTON

GRINDERS and LAPPERS

Making better products to make other products better

District Sales Offices: Hartford . New York . Cleveland . Chicago . Detroit

BURA-WAY...with the "TOUCH OF GOLD"



BURA-WAY does it better. This Norton Tool Grinder for convex single point and form tools: (1) generates, reproduces and maintains relief angles *constant in the direction of feed*, providing uniform support to the cutting edge and; (2) insures exact duplicates of the master tool form.

Here's longer life for your carbide-tipped tools with the Norton No. 2 BURA-WAY Tool Grinder

Your operator gives you the "Touch of Gold!"

When he's sharpening your carbide-tipped tools on the Norton No. 2 BURA-WAY he is adding longer life value to the tools, helping you to make more profit and turn out better products for your customers. Every time the wheel touches the tool, it adds the product-improving, cost-cutting "Touch of Gold."

Precise Duplicates Every Time

In the BURA-WAY No. 2 you have the ideal tool grinder. The BURA-WAY method increases tool life and gives you more pieces per sharpening. By exact duplication of the master tool, tremendous additional benefits may be realized from an effective tool control system and reduced set up time when changing tools.

Find Out More

Get in touch with your Norton representative whose knowledge and experience is further supplemented by Norton trained engineers. Only Norton offers you such long experience in both grinding machines and wheels to help you produce more at lower cost. Write NORTON COMPANY, Machine Division, Worcester 6, Mass.

To Economize Modernize With NEW

NORTON

GRINDERS and LAPPERS

Making better products to make other products better

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J. H. Ryder Machinery Co., Ltd., Toronto 5

PRODUCTION TIME

PRODUCTION DATA

PART — QUICK CHANGE CLAMP COLLAR
MATERIAL — SAE 4615.
CUTTER — ¼ dia. — 2 lip — HSS endmill.
SPINDLE SPEED — 600 rpm — (80 sur. ft./min.)
LOT SIZE — 25 to 50 pcs.
CYCLE TIME (FLOOR TO FLOOR) — 15¾ minutes.
PREVIOUS CYCLE TIME — 34 minutes.

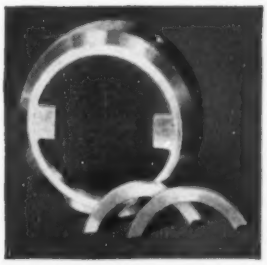
(A) 6" (B) 4⅛" (C) 3¼"
(D) −1" + ±.000 (E) −1" + ±.005 (F) ⅜"

OPERATION 1 — Rough mill one side of tongue.
PROCEDURE — Offset spindle slide radius (A), set rotary head to angle (B), feed table to workpiece centerline (C to D).

OPERATION 2 — Rough mill radius section between tongue.
PROCEDURE — Rotate head from angle (B) to angle (E).

SLASHED BY 53%!

Rotary Head Milling Machine simplifies method and cuts costs on still another production job



Here's the completed workpiece together with two pieces of waste.

IN production of this Quick Change Clamp Collar, considerable savings were effected by using a versatile Kearney & Trecker No. 2 Model D Rotary Head milling machine.

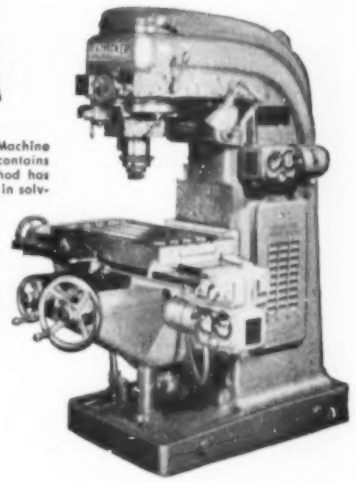
The radius of the piece was produced merely by offsetting the spindle slide and rotating the machine's head. The job was done faster, more accurately than would be possible with any other method.

Practically no other standard machine can mill these parts without a change in setup and cutters, maintain accuracy, yet complete the job in less than 16 minutes!

For details of this operation, see the diagrams below. Note: Model D's table and saddle movements are independent, will not affect the radius setting—think what that means not only to this job, but also in terms of a wider range of applications for other work.

Here's the Rotary Head Milling Machine Production Idea Booklet. It contains several examples of how this method has been found exceptionally efficient in solving production, die, forging and metal pattern milling problems. It's yours for the asking.

Address requests for booklet to Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.



KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

OPERATION 3 — Rough mill one side of opposite tongue.
PROCEDURE—Feed Machine table from (D) to (F).

OPERATION 4 — Rough mill end of tongue.
PROCEDURE—Feed machine saddle from (F) to (G).

OPERATION 5 — Rough mill second half of inner contour.
PROCEDURE — Repeat Operations 1 through 4, working area to be in the lower half of opening.

OPERATION 6 — Finish mill 4⅝" dia., end of tongues to 3¼" dimension and width of tongues to 1" + .000 —.005.
PROCEDURE — Reverse sequence of Operations 1 through 5.

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY

TO AVOID TROUBLE—DON'T INVITE IT!

One way to avoid costly machine tool breakdowns
and down-time is to head off the trouble
before it starts—with a positive
preventive maintenance program.

Another way—and an important one—buy the
machine that is backed by an industry-wide
reputation for long years of trouble-free service.

When the going gets tough—
put it on the Warner & Swasey!

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

When you want on any cutting-tool

here are 5 reasons to call your

MORSE-Franchised DISTRIBUTOR

● **COMPLETE LINE:** Drills, Taps (including a new line of Special-Purpose Taps . . . and 7 new basic *and conversion* sets of Taps and Dies, handsomely boxed), Dies, Reamers, Cutters, End Mills, Counterbores and Countersinks.

● **AMPLE STOCKS:** Your Morse-franchised Distributor is ready to supply you with the Morse Quality Cutting Tools you need. *New Morse methods of production, inventory control and expediting put him in a far stronger position in '53 than ever before.*

● **ON-THE-JOB EXPERIENCE:** Your Morse-franchised Distributor knows his way around on cutting-tool applications, to give you *increased* production and *reduced* costs.

● **CLOSE CO-OPERATION FROM MORSE ENGINEERS:** On any "cranky" or special problem, your Morse-franchised Distributor can immediately summon the help of Morse's top technical men.

● **PROVEN RESPONSIBILITY:** Your Morse-franchised Distributor is a respected member of your business community. You can have full confidence, *as Morse has,* in him and his men.

THAT'S WHY IT'S ALWAYS GOOD BUSINESS TO "CALL YOUR MORSE-FRANCHISED DISTRIBUTOR"

MORSE TWIST DRILL & MACHINE COMPANY, NEW BEDFORD, MASS.

(Division of VAN NORMAN CO.)

Warehouses in New York, Chicago, Detroit, Houston, San Francisco

ACTION!

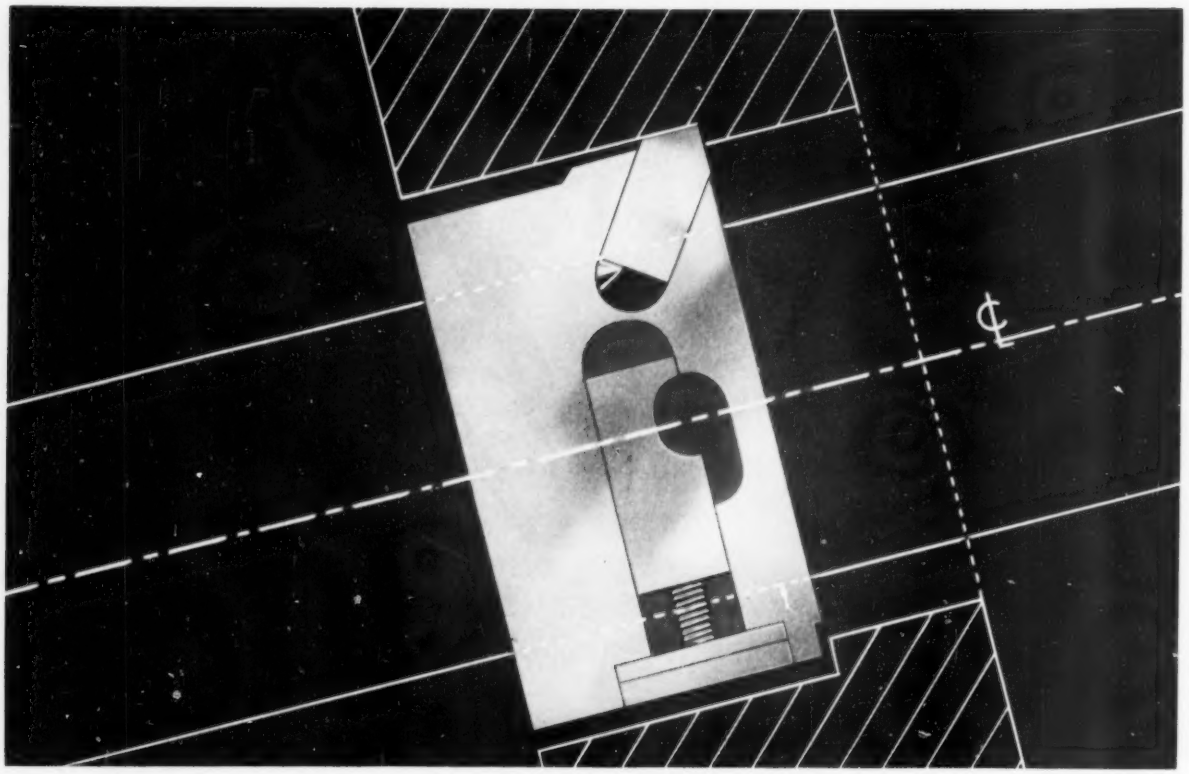
problem . . .

MORSE

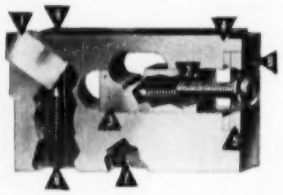
Cutting Tools

Buy them by phone from your Morse-Franchised Distributor and save ordering time

Get fast, positive line boring accuracy for 2½" to 17" dia. with...



DAVIS SINGLE CUTTER MICROMETER ADJUSTABLE BLOCKS



1. Cutter — Carried in stock of HSS or Tungsten Carbide tipped. Other materials per order.
2. Micrometer adjusting screw.
3. Gib — Hardened and precision ground to fit dovetail slot in block, allows for seating and accurately clamping of block with taper lock screw. The taper lock screw clamps the block firmly against the rear of the slot in the same manner as used in the Davis standard block type construction.
4. Keeper Plate — Retains adjusting screw.
5. Keeper Block — Retains adjusting screw.
6. Keeper Screws — Holds assembly in block.
7. Centers—For circle grinding cutter on diameter.
8. Cutter Support Screw — Supports and adjusts cutter for regrinding purposes.
9. Cutter Lock Screw—Locks cutter firmly in place.
10. Cover Plate — (Not Shown). Dovetailed to fit block prevents entrance of foreign matter into gib and screw assembly.

HERE'S the way to boost efficiency on general purpose jobs that demand rigidity and a wide range of cutter adjustments.

In addition to regular line boring with either standard or special bars, Davis tools with the exclusive adjustable feature are easily adapted to counterboring, undercutting, grooving, facing or chamfering. Block and cutter adjust as a unit to assure full cutter support at all settings.

Made of high grade tool steel, hardened and ground, the blocks can be furnished with High Speed Steel, Cobalt, Stellite, Tungsten Carbide tipped or Tantalum Carbide tipped cutters.

For details, write for bulletin No. 602.

If Davis can't bore it, it can't be done!

DAVIS BORING TOOL DIVISION

GIDDINGS & LEWIS MACHINE TOOL CO., FOND DU LAC, WISCONSIN

Builders of plain and micrometer adjustable block type boring tools; line boring bars; special boring tools; car wheel boring tools; planer, vertical boring and turning mill tools; Quick Change arbors and sleeves.

For CIMCOOL covers 85% of all metal cutting jobs!

● CIMCOOL° leads the league because it's a radically new and different cutting fluid that replaces all water emulsions and all but a few highly compounded specialty oils.

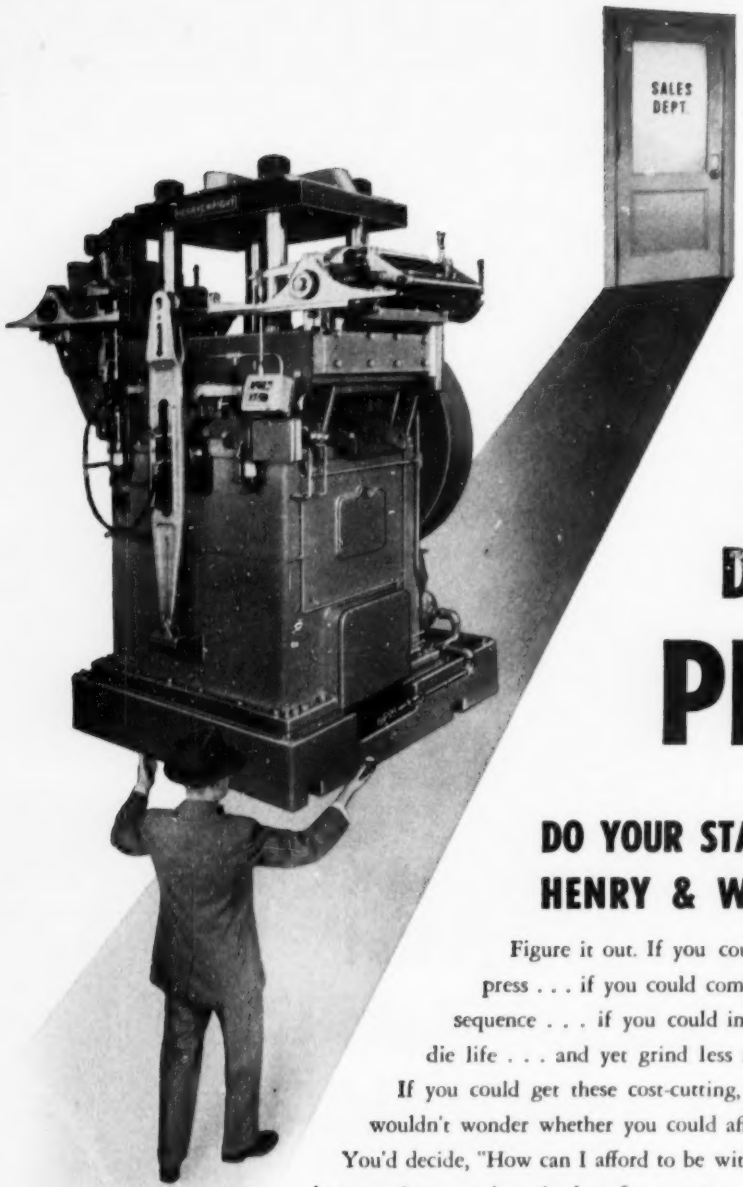
● Cimcool scores over old-fashioned coolants because it's a *chemical emulsion*. It permits faster speeds and increases tool life because Cimcool combines friction reduction and cooling capacity in a degree never before attained. It's longer lasting in machines, too. So Cimcool reduces downtime and cuts labor costs for cleaning and changing.

● For a demonstration of how CIMCOOL can improve your production batting-average, just write us. We'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Or, if you prefer, write for our free booklet, "Cimcool Defeats Heat." Address Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

°Trade Mark Reg. U.S. Pat. Off.

A Production-Proved Product of
THE CINCINNATI MILLING MACHINE CO.

for 85%
OF ALL METAL CUTTING JOBS



RUSH YOUR SALES DEPARTMENT A PRICE CUT

DO YOUR STAMPING PROGRESSIVELY ON HENRY & WRIGHT DIEING MACHINES

Figure it out. If you could produce dozens of different jobs on one press . . . if you could combine separate operations into one progressive sequence . . . if you could improve accuracy, get higher speeds with longer die life . . . and yet grind less metal off the die to sharpen it . . .

If you could get these cost-cutting, labor-saving, inspection-reducing benefits, you wouldn't wonder whether you could afford a Henry & Wright Dieing Machine now. You'd decide, "How can I afford to be without it now?" Well, let's talk serious business, because those are just the benefits everyone gets with Henry & Wright Dieing Machines —and, brother, how the Sales Department will love that price cut you'll give them.

HENRY & WRIGHT DIEING MACHINES . . . A PROFIT WITH EVERY STROKE

Only the best is good enough

H&W

HENRY & WRIGHT

DIVISION OF EMHART MFG. CO.

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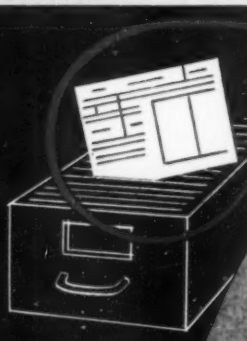
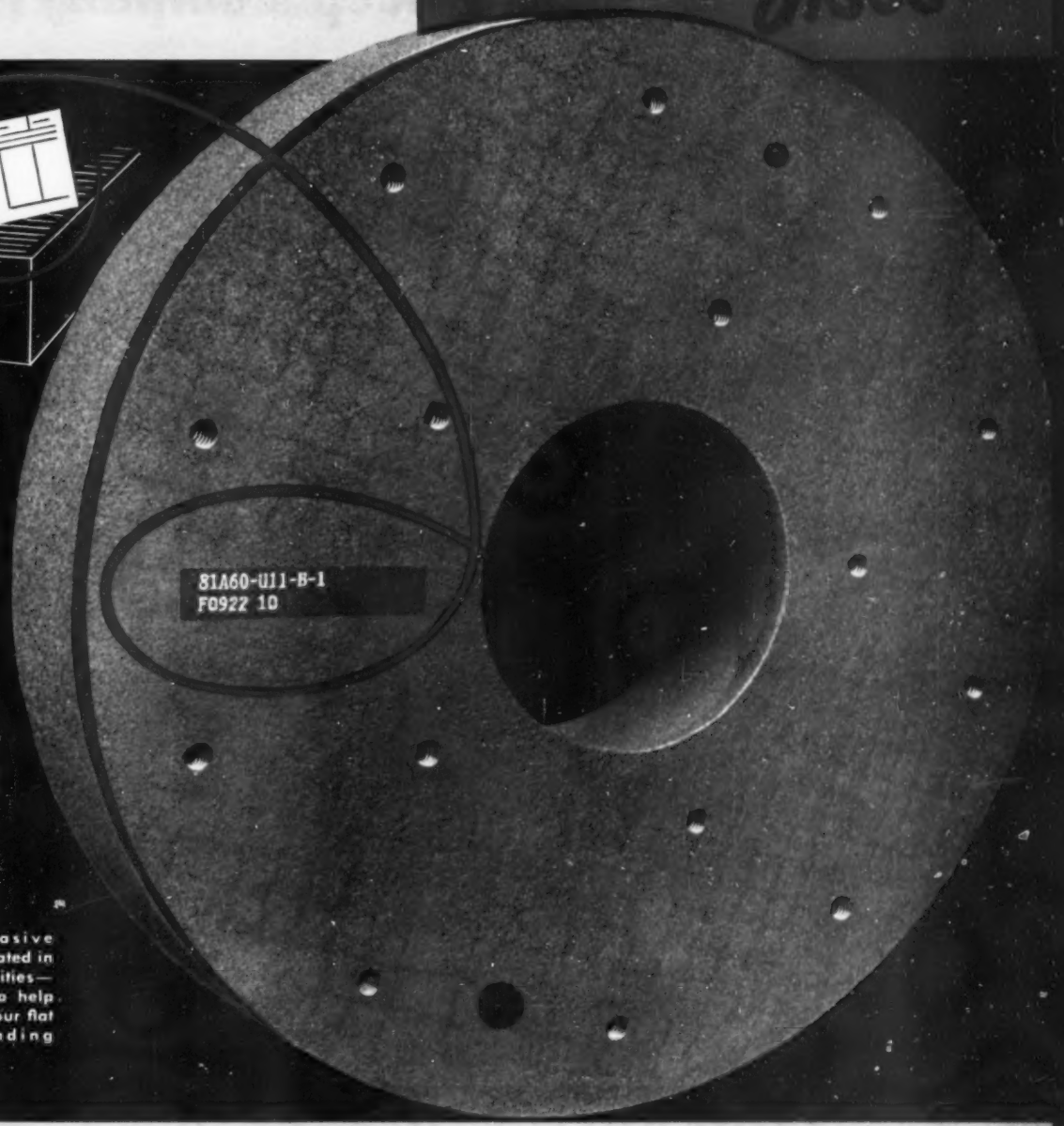
NEW CATALOG Get up-to-the-minute facts on Dieing Machines — capacities range from 25 tons to 2500 tons. Write Henry & Wright, 481 Windsor St., Hartford, Conn.

Customized Abrasive Discs Fitted To Your Grinding Needs

GARDNER abrasive discs





Gardner Abrasive Engineers—located in all principal cities—will be glad to help you with all your flat surface grinding problems.

Send for Gardner Abrasive Disc Guidebook for better surface grinding results.

Gardner varies abrasive type, grain size and structure until you get the *best* abrasive to meet your job requirements. You get a Gardner Customized Abrasive that meets your needs for production, stock removal, finish, tolerance. Once your specific formulation is determined, the card record goes into our permanent file. Grinding results on reorders will be duplicated because your specific abrasive formulation has been duplicated. 109 A

GARDNER MACHINE COMPANY

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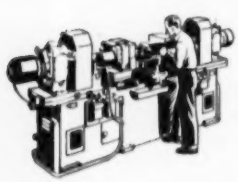
LINK-BELT ball and

. . . keep company with

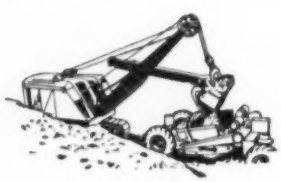
Latest design of the rugged Allis-Chalmers AD-40 Motor Grader includes Link-Belt Series DE self-aligning roller bearings. Allis-Chalmers relies on precision Link-Belt bearings on such other products as track-type and wheeled tractors, harvesters and balers.

LINK-BELT ball and roller bearings

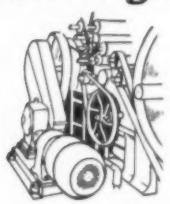


Metal Working Machinery

Farm Machinery



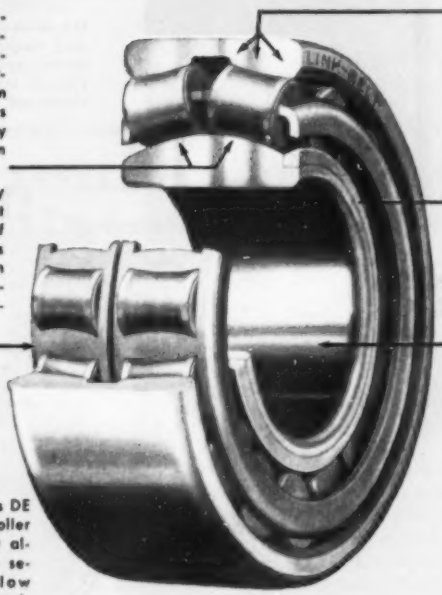
Construction Equipment



Textile Machines

roller bearings

America's hardest-working machines


Integral self-alignment—angular contact of concave rollers operating between convex raceways — inner raceway free to move in any direction.
Full load capacity for radial, thrust or combination of radial-thrust loads is assured even with shaft deflection or misalignment.
Accurately formed, hardened steel retainers space and guide the rollers.
Rollers are naturally positioned by their concave shape, assuring free rolling and eliminating end friction — no pinching or binding of rollers.
Bearing parts are assembled to proper clearance and locked together as a complete assembly.
Straight bore mounting for press fit direct on shafting. Tapered adapter sleeve also available for use with commercial shafting where ready means of removal and installation of bearing are advantageous.

Cutaway of Series DE Self-Aligning Roller Bearing. Link-Belt also offers a wide selection of pillow blocks, flanged, flanged cartridge, cartridge, hanger and take-up blocks.

LINK-BELT

BALL and ROLLER BEARINGS

IN addition to meeting industry's requirements for mounted ball and roller bearings, Link-Belt builds integrally self-aligning roller bearings. Concave rollers between convex raceways provide angular contact for ample capacity under *both* thrust and radial loading.

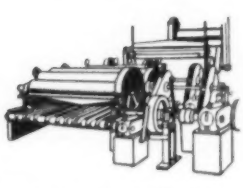
As on all Link-Belt bearings, precision manufacture assures you of long-life, free-rolling shaft support. Preadjusted for clearance at the factory and packed to reach you in "final inspection" condition, they require no adjustment when you're ready for installation.

Next time you specify bearings for one of your machines, call the Link-Belt office near you. They'll put you in touch with a Link-Belt bearing engineer who can give you expert advice on *any* bearing application. You can also get all the facts from Data Book 2550.

LINK-BELT COMPANY: Plants: Indianapolis, Chicago, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities.

13.310

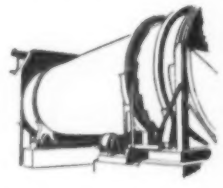
smooth the path of power for all industry



Pulp & Paper Machinery

Materials Handling Equipment

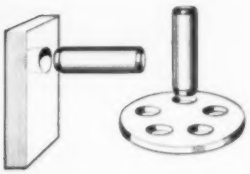
Oil Field Equipment



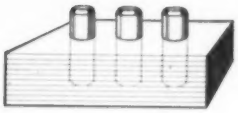
Processing Equipment

Our Fiftieth Year

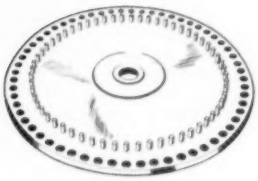
A START FOR THE FUTURE



Use UNBRAKO Dowel Pins as plug gages in various production operations, as guide pins, as stops, as wrist pins, hinges and shafts.



As fasteners for laminated sections, machine parts. As roller bearings in casters, truck wheels, etc.



As position locators on indexing machines, for aligning parts, as feeler gages in assembly work, as valves and valve plungers on hydraulic equipment.

UNBRAKO PRECISION-GROUND ALLOY STEEL DOWEL PINS feature the following: formed ends which won't chip; 60-62 Rockwell "C" Scale surface hardness; 6 microinch maximum surface finish; 50-54 Rockwell "C" Scale core hardness; 150,000 psi average single shear strength; ±0.0001" diameter tolerance; 2 standards—blue label pins, .0002" oversize for nominal press fit requirements and red label pins, .001" oversize for use as repair pins.

See your distributor for UNBRAKO standards

You save time and money ordering UNBRAKO socket screw products from your UNBRAKO industrial distributor. He has a complete stock, offers excellent service and prompt deliveries. Write for UNBRAKO Standards. SPS, Jenkintown 1, Pa.

Write for UNBRAKO Standards

UNBRAKO® SOCKET SCREW DIVISION

SPS JENKINTOWN PENNSYLVANIA

Production Pointers from GISHOLT

TIME-SAVING IDEAS

Presented as a service to machine shops, we hope some of these interesting ideas, culled from thousands of jobs, will suggest ways to help you cut time and costs in your own metal work.

AN EXCELLENT WAY TO MACHINE GATE VALVE PARTS

No. 12 Hydraulic Lathe Performs 5 Operations with One Set of Tools

Valve seat rings and gate wedges.

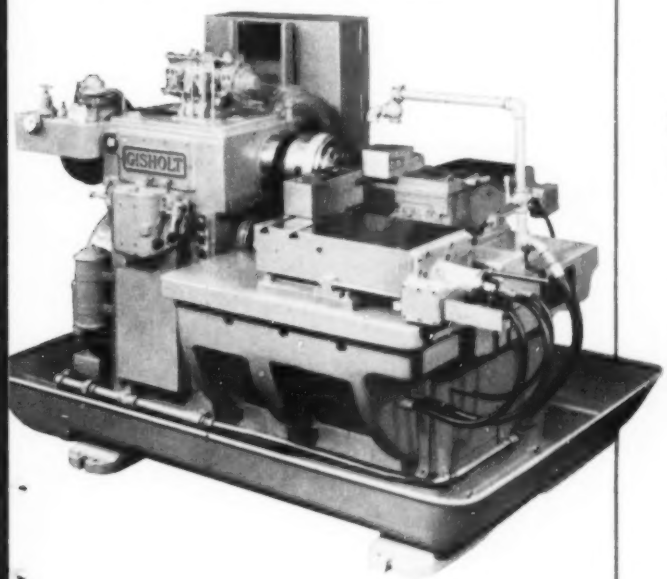
Here is an efficient setup for producing seat rings and slotted wedges for gate valves. A Gisholt No. 12 Hydraulic Automatic Lathe is doing the work on the stainless steel parts requiring close tolerances.

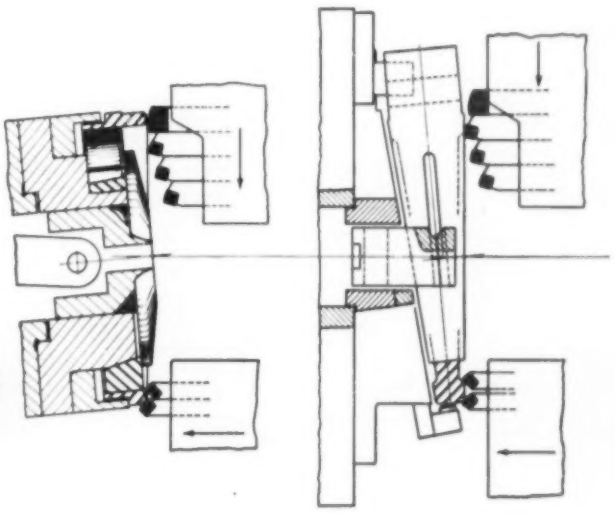
A total of six tools is used to machine the 8″ five-degree valve seat rings which are held in a special fixture. Tools on the rear slide rough and finish face while tools on the front slide chamfer inside and outside the seat diameters. The workpiece is held on an air-operated expanding mandrel set at five degrees from the spindle axis. Time is only 3 minutes floor-to-floor.

Changeover for machining the wedges is fast and easy. The same tooling is used and a 2-jaw chuck replaces the fixture. The gates are then machined on one side. To do the next side, the workpiece is reversed. After this operation the part is heat-treated. It is then returned to the No. 12 and light finishing cuts are taken on both sides, leaving a 30 to 40 micro inch RMS finish. Time for each side is 2 minutes. Locating blocks are adjustable and different sizes can be handled with this setup.

This No. 12 Hydraulic Lathe with its completely automatic cycle, and well planned tooling handles various sizes of two different parts.

The No. 12 Hydraulic Automatic Lathe.





Tooling and fixture for machining seat rings.

Same tooling with 2-jaw chuck for wedges.

GISHOLT

TIME-SAVING IDEAS

TRY THIS TIME-SAVER ON MULTIPLE FACE PARTS

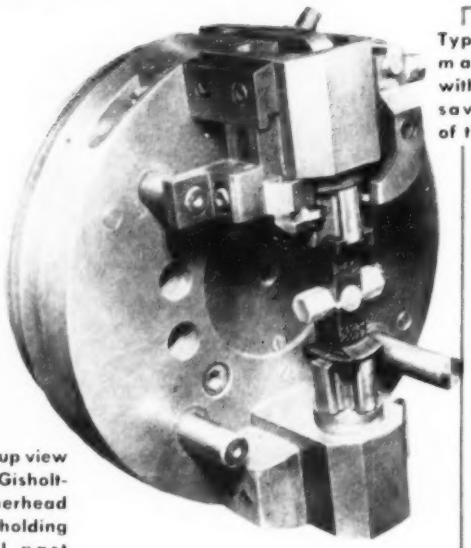
Work is Indexed Without Stopping Spindle

Do you have the problem of machining two or more sides or ends of small parts? The Gisholt-Weatherhead chuck, mounted on a No. 5 Ram Type Turret Lathe, can be your time-saving solution.

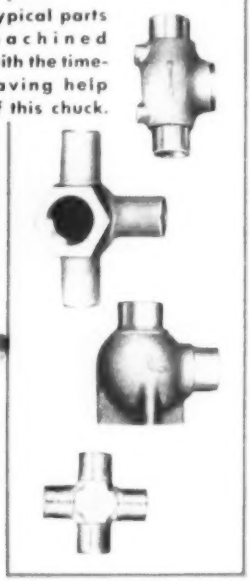
This quick-indexing, two-jaw chuck is air-operated. It permits you to index the workpiece *without* stopping the spindle. It's an important time-saving feature that means more production per hour; easier work for the operator.

If you machine small to medium size valves, cocks, tees, ells, crosses and similar multiple station parts, you should have full information on the Gisholt-Weatherhead chuck. Ask for the Gisholt Chuck catalog.

Here's a Production Pointer that tells how to machine similar faces of parts without unchucking the part . . . or even stopping the spindle.



Close-up view of the Gisholt-Weatherhead chuck holding small part machined on all four sides.



Typical parts machined with the time-saving help of this chuck.

ON JOBS LIKE THIS POWER AND RUGGEDNESS PAY OFF

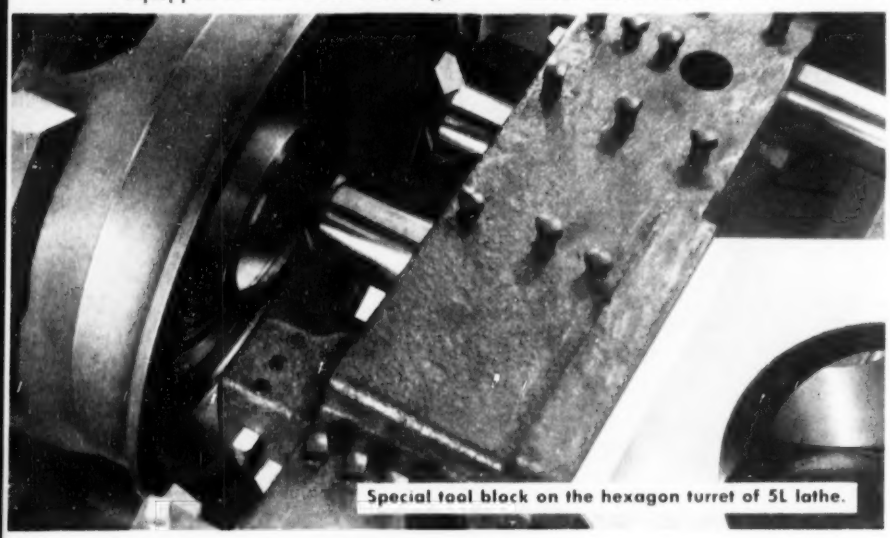
Big Saddle Type Lathe Has Cross Feeding Turret

For hogging off metal on hefty parts, like this heavy steel aircraft engine crankcase section, it takes a machine with plenty of power and rigidity.

This big 5L Saddle Type Lathe with its 36½" swing over the bedways is up to the job on both counts. It's equipped with a 50 H.P. driving motor and has a cross-feeding turret. There's a special tool block mounted on one face of the hexagon turret which feeds into the work and then laterally so that the seven separate tools handle all operations. The rim is turned and faced, two diameters are bored and both OD and ID are rough formed—all in this one movement. Then the tools on the square turret finish form the OD and ID.

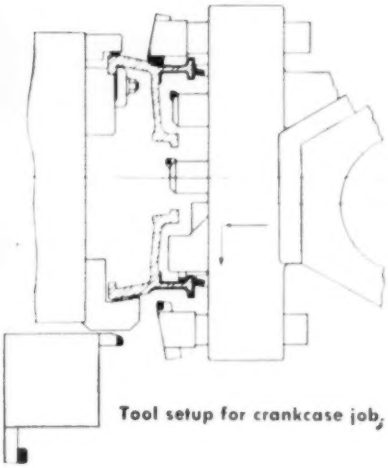
It's another case where the sheer power and ruggedness . . . plus combination tooling of a standard Gisholt Saddle Type Lathe . . . pay off on a special job. Once the job is completed, the machine can be quickly tooled for standard turret lathe work.

You should have the Bulletin on the 5L Saddle Type Lathe if your work is of this size. Write; we will also include information on standard tools.



Special tool block on the hexagon turret of 5L lathe.

Seven tools combined on one head plus a sturdy turret lathe give fast production on unusual job.



Tool setup for crankcase job.

GISHOLT

TIME-SAVING IDEAS

2 JOBS—1 MACHINE—1 TOOL SETUP

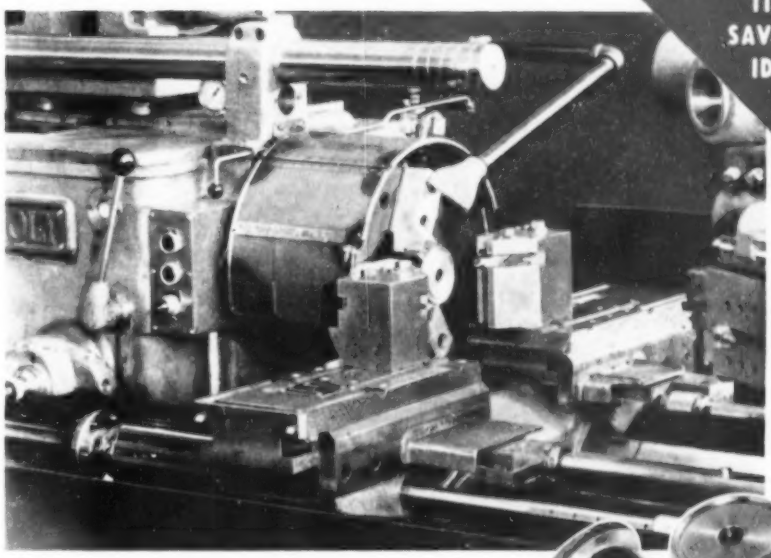
Valve Guide Machining Shows How It's Done

The two operations required to machine these valve guide parts are handled as separate jobs on this Fastermatic Automatic Turret Lathe. Yet, both jobs are done with just *one* set of tools on the hexagon turret.

For the first operation, tools are used in stations 1 and 2 of the hexagon turret. These do rough and finish turning while tools on the cross slides face, form and chamfer. Meanwhile, through the use of the reduced travel feature of the Fastermatic, the rest of the turret stations are by-passed.

For the second operation, the tools which were already set up and inactive in the first operation are now utilized. By merely changing the tools on the front and rear cross slides, the second operation is completely set up. This time tools on the hexagon turret do turning, boring and grooving, while tools on the cross slides face, form and chamfer.

This Fastermatic feature saves setup time and makes changeover fast and simple.



Close-up showing tooling on front and rear cross slides.

There's no re-tooling of the hexagon turret between operations on this job because all tools for both operations are there from the start.

Valve guide before and after machining.

HOW ALL ANGLES ARE COVERED ON THIS FAST SIMPLIMATIC JOB

Adjustable Tool Slides Cope with Different Cone Angles

Rotary rock bits for oil well drilling are big business. Here, production is getting a big boost by an excellent setup on a Gisholt Simplimatic Automatic Lathe.

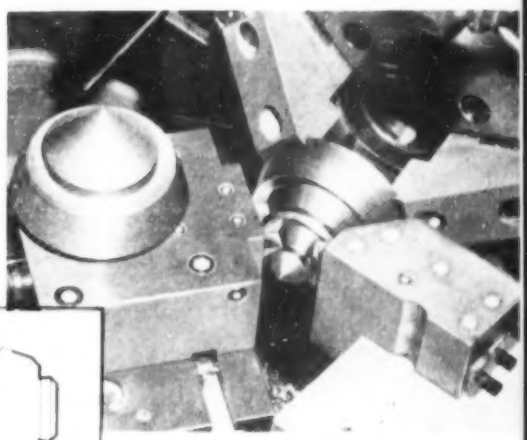
It's handling first and second operations on the three types of bits shown in the drawing. In the first operation, front-slide turning tools turn the various angular outside surfaces. Time: 1.5 Min. f.t.f.

In the second operation, tools on the front and rear slides groove the cutter bits in only .8 minute.

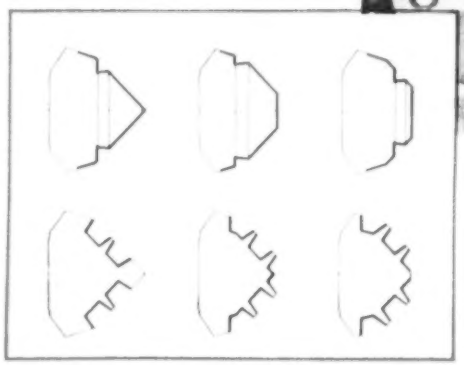
A time-saving feature of the tool slides are their swivel bases which make them adjustable for machining the different cone angles required by the three types of bits.

With one set of tools, this Simplimatic handles two operations on three types of rock bits—all having different angles.

Workpiece after first and second operations.



Second operation in machining rock bits.



The 3 types of rock bits.

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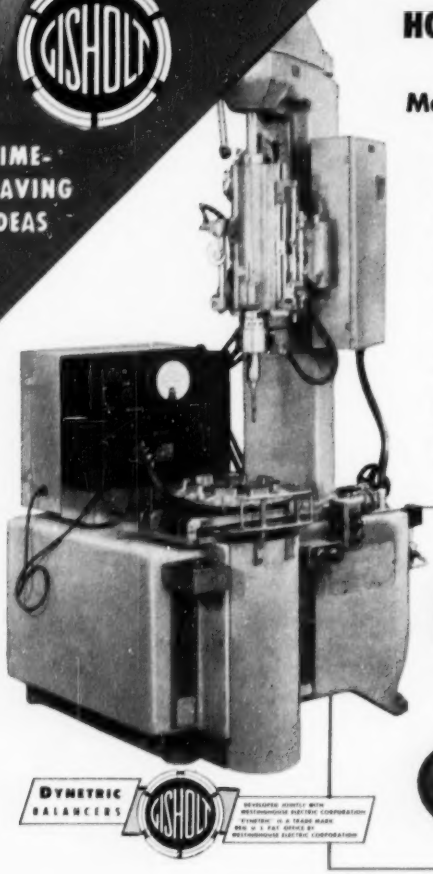
TIME-SAVING IDEAS

HOW BALANCING HELPS TAKE THE SHAKES OUT OF TRACTORS

Machine Measures and Corrects Unbalance in Variety of Parts



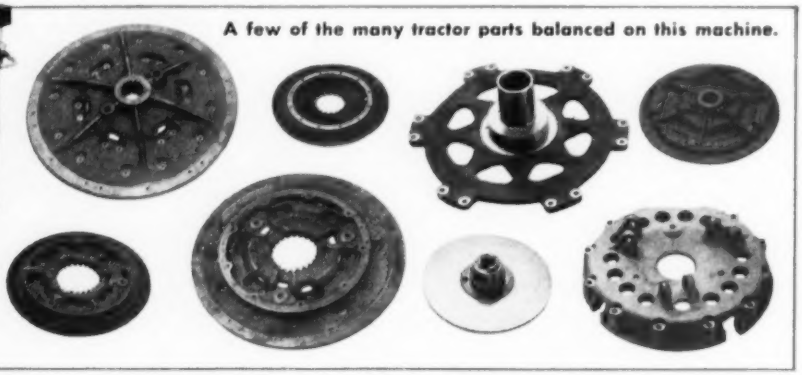
Balancing does wonders, as this tractor manufacturer has learned. Operation is smoother and vital parts last longer because flywheels and clutch components are precision balanced on a Gisholt 1SV1 DYNETRIC Balancer.

Static unbalance is measured, located and corrected on the one machine. The operator reads the amount of unbalance from the large meter. Correction is then made by the integral-mounted drill which removes the exact amount of metal to bring the part into balance.

This Balancer handles a wide assortment of parts, ranging from 10 to 65 lbs. and up to 21 inches in diameter. Special adapters are used to locate, support and hold each type of workpiece.

For full information on balancing, write for the booklet, "Static and Dynamic Balancing." Also ask for details on Gisholt Balancing School.

Static balancing is a quick, inexpensive operation that gives these tractor parts longer life with less vibration.



A few of the many tractor parts balanced on this machine.

50-SECOND SUPERFINISHING OPERATION—YEARS LONGER BEARING LIFE

Gisholt Model 51-A Cylindrical Superfinisher with workpiece in place.

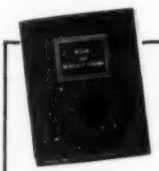
Job Done Automatically

The part you see loaded in this Gisholt Model 51-A Superfinisher is a planetary gear housing. Two bearing diameters, one measuring 3⅛" and the other 1½", are being Superfinished.

The two-speed rough-and-finish machine cycle is predetermined, adjustable and fully automatic, except for loading. With the part held by an air-operated draw-back fixture, both bearing diameters are simultaneously Superfinished from approximately 20 micro inches RMS down to 6-8. A special upper oscillating head with two quill units, one standard and the other with 4" vertical travel, clears the workpiece for loading and unloading. Floor-to-floor time is only 50 seconds and production is 57-60 parts per hour at 80% efficiency.

Superfinishing, by ridding the bearing surfaces of smear metal, chatter marks and other irregularities, greatly increases the service life of the parts.

In one fast automatic operation, Superfinishing gives these two bearing surfaces a smoothness that assures much longer life.



The textbook, "Wear and Surface Finish" covers all phases of Superfinish. Your copy is free for the asking.

No. 3-453

607

GISHOLT

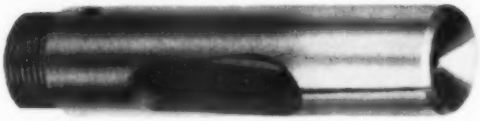
THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY Madison 10, Wisconsin

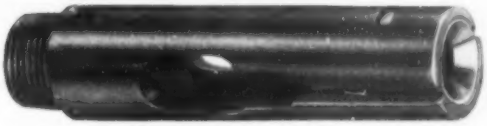
TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Power Spring Collets
(regular type)

Power Spring Collets
(taper nose type)



Feed Fingers (regular type)



Master Feed Fingers and Pads

Master Feed Fingers
with Adjustable Tension

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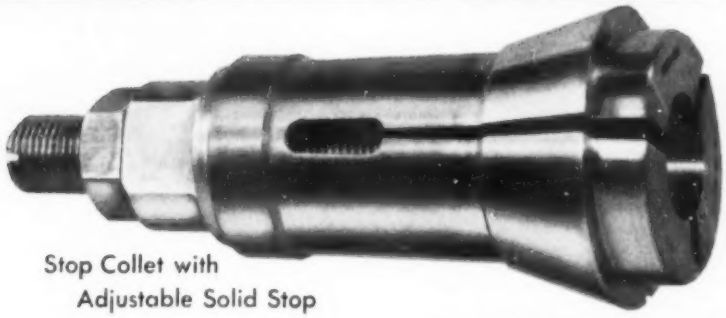
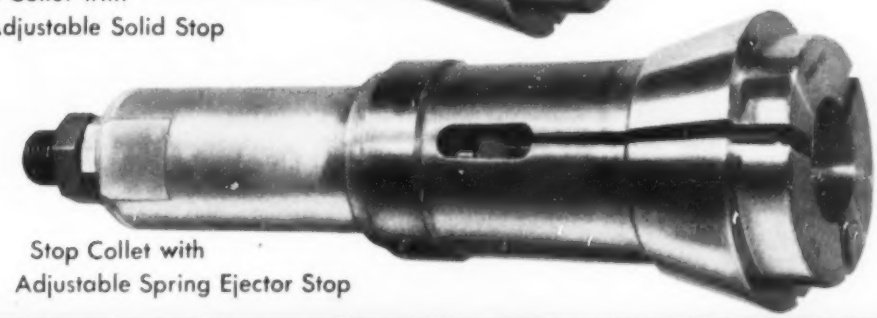
PRECISION PRODUCTS
for BROWN & SHARPE machines

For maximum production efficiency, specify Hardinge precision products for your Brown & Sharpe Automatics and Wire Feed Screw Machines. Reduce tooling costs and step up production with these and other Hardinge precision products engineered, customer-shop tested, and approved for Brown & Sharpe machines. Write for Catalog 36 — contains complete descriptions, specifications, and ordering information.

Deliveries from stock



Stop Collet with
Adjustable Solid Stop



Stop Collet with
Adjustable Spring Ejector Stop

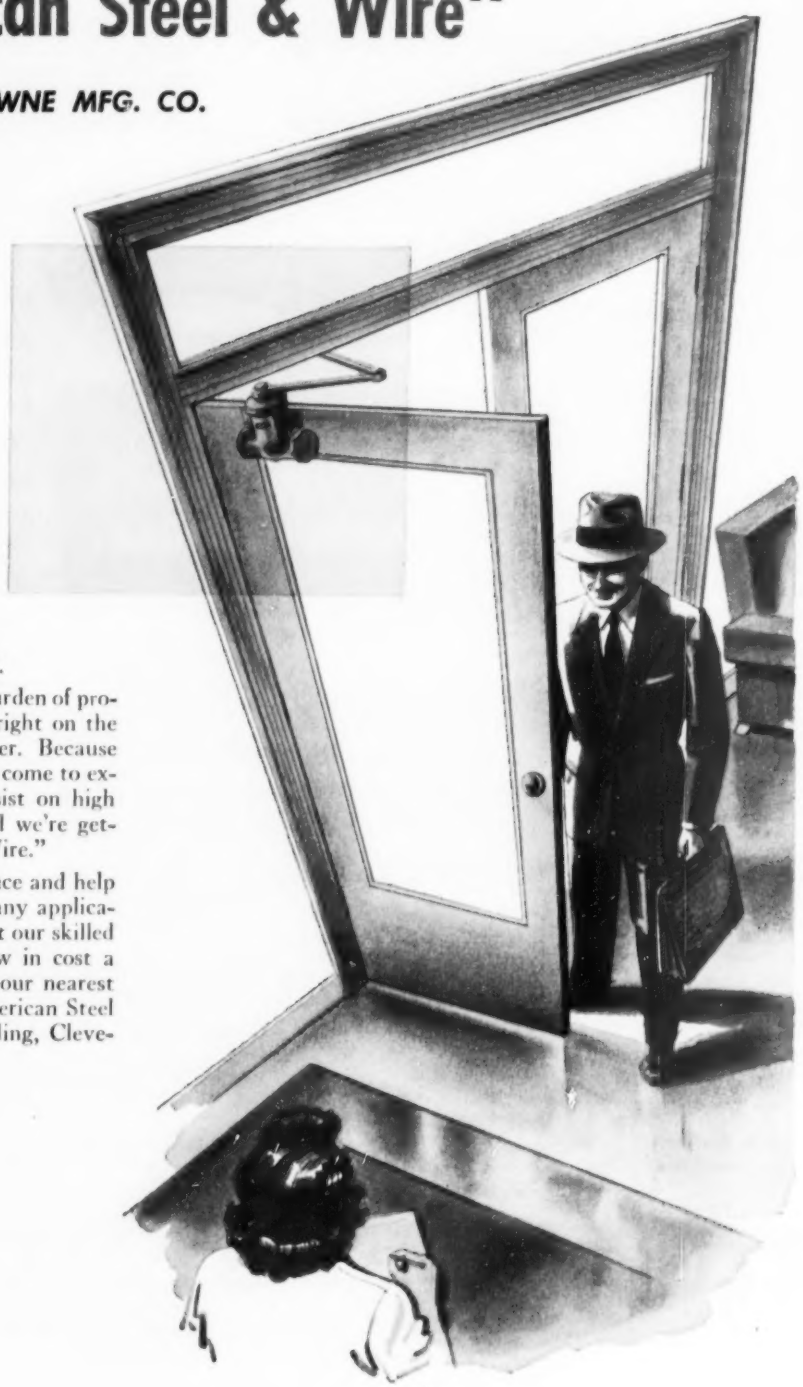
HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

Offices in principal cities. Export office 269 Lafayette St., New York 12, N. Y.

"We insist on high quality springs—without flaws; and we're getting them from American Steel & Wire"

—SAYS THE YALE & TOWNE MFG. CO.



Yale Door closers are so reliable that nobody even *thinks* about them after they are installed. They're like brakes on a car: inconspicuous, yet they are expected to work every time without fail. Some of them, installed in public buildings, are flexed over 3½ *million* times in a ten year period.

A compact and powerful helical torsion spring is the heart of this famous door closer. It must deflect a full 150°, and store enough energy to return a heavy door against a strong wind.

As Yale & Towne puts it: "The burden of producing a high quality spring falls right on the shoulders of the spring manufacturer. Because of the great service life people have come to expect from our door closers, we insist on high quality springs—without flaws; and we're getting them from American Steel & Wire."

American Steel & Wire can produce and help you design a spring for just about any application, any size, any steel or finish. Let our skilled spring engineers show you how low in cost a truly superior spring can be. Call our nearest District Sales Office or write to American Steel & Wire Division, Rockefeller Building, Cleveland 13, Ohio.

FIRST, the springs are dipped in a special graphite and tallow mixture that was developed by Yale engineers. Then the springs are capped with plates and made into a spring group.

HERE is the final spring assembly in the Yale & Towne $75 door closer.

THIS IS the final check on the completed door closer. A steel bar is used to tighten the spring, then the bar is abruptly released. If spring action is correct, the unit is ready to be shipped.

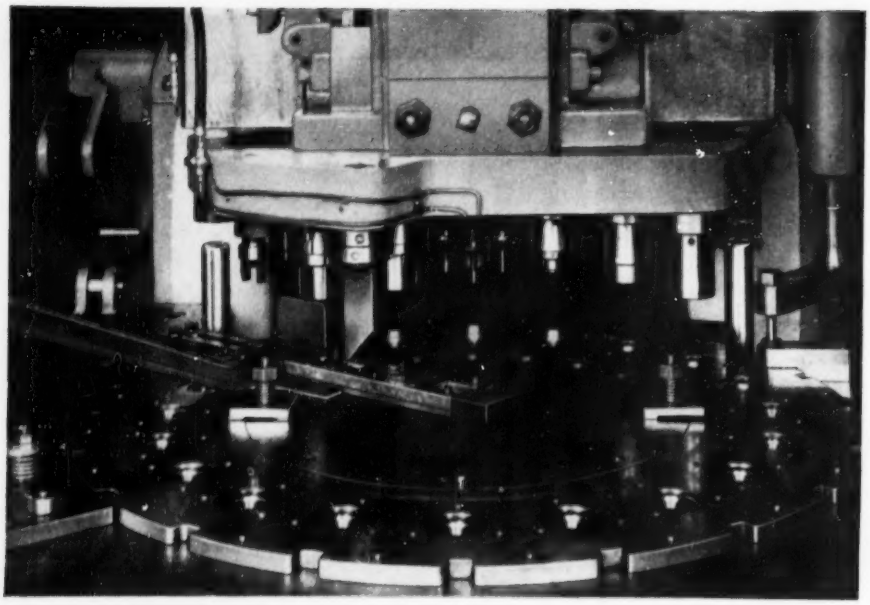
MANY quality control checks are made at Yale & Towne, including this endurance test. Here, a door is opened and closed repeatedly, simulating the operating conditions in a heavy traffic area.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL CORPORATION, GENERAL OFFICES: CLEVELAND, OH.
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

U·S·S American Quality Springs

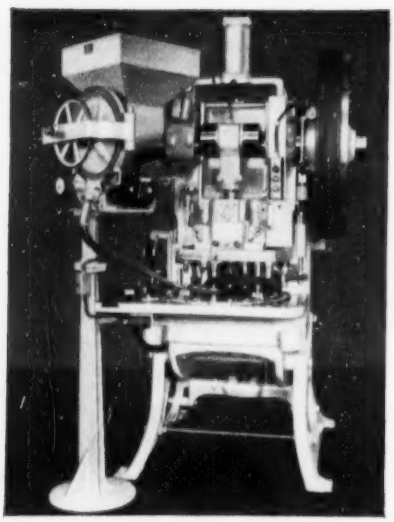
UNITED STATES STEEL



All important tooling is in plain sight, easily accessible for maintenance or adjustment, the way it would be designed by the company that makes V&O easily tooled long slide presses and V&O safe operation dial feeds.

When You Want Parts not Problems Think of Equipped Presses by V&O

Equipped presses can combine a few operations or make a complete product . . . .



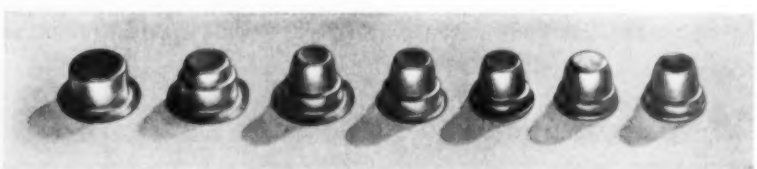
Pour blanks into the hopper at the upper left, push the starting button, and take the finished parts away. That is all the operator of this machine needs to do — or needs to know how to do.

The product is a low vapor pressure can closure. Its user wanted products, not press tooling problems. So V & O supplied a complete machine to do the job.

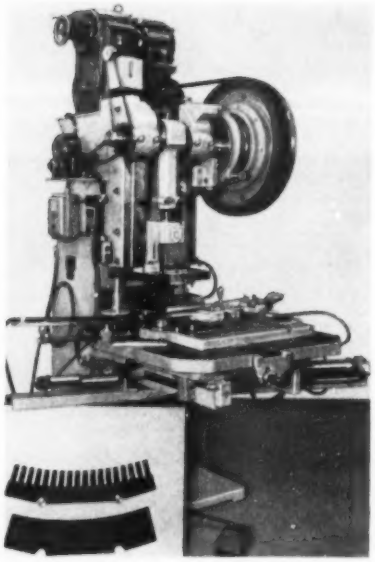
All the operator needs to do is feed blanks into a hopper and take finished parts away. The hopper delivers to a dial feed. Several operations then are automatically performed: draw, first re-draw, second re-draw, trim, curl, close curl, and pierce. The machine cannot falter, cannot commit any "human" errors.

Completely gone are such intermediate operations as materials-handling of the pieces from one of these operations to another, and hand-placing of partly finished pieces in dies. One press is doing work that formerly would have required several. Floor space requirement is minimized.

There are thousands of parts designs for which operations can be combined and simplified in this manner. You probably have some in *your* shop. Why not write V&O about them?

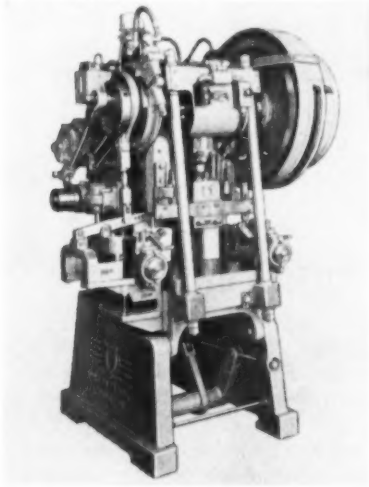


Left to right: Draw, first re-draw, second re-draw, trim, curl, close curl, pierce.



V & O Segmental Notcher, an Equipped Press for a specified field.

V & O High Speed Press, one of a family of Equipped Presses.



Special Presses by V&O Designed to Improve Specific Types of Operations

Notching Presses

● V & O Notching Presses are the highest precision, highest speed, and most adaptable set up machines ever offered for this purpose. They are an example of V & O Equipped Presses designed for a field of usage rather than for the making of just one part.

High Speed Power Presses

● V&O High Speed Presses move too fast for the average operator to keep up. Hence, they are equipped with roll feeds, scrap cutters, other devices to do what the operator might otherwise do. They are a family of perfectly integrated high precision Equipped Presses.

WRITE US, PLEASE

One of our engineer representatives is near you. Our catalog is yours for the asking. Please write The V & O Press Company, Division of Emhart Mfg. Co., 301 Union Turnpike, Hudson, N. Y.

THE V&O PRESS COMPANY

Division of Emhart Mfg. Co.

BUILDERS OF PRECISION POWER PRESSES AND FEEDS SINCE 1889

HUDSON NEW YORK

Only the best is good enough

Why Users Hold Onto V&O Presses

Long Slide Advantages

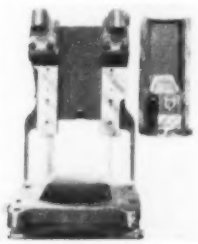
● Long slide precision and tooling ease can't be found on just any press you pick up. Users keep V & O Presses to keep those advantages in their shop.

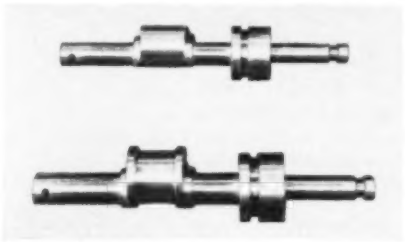
Stiffer Eccentrics

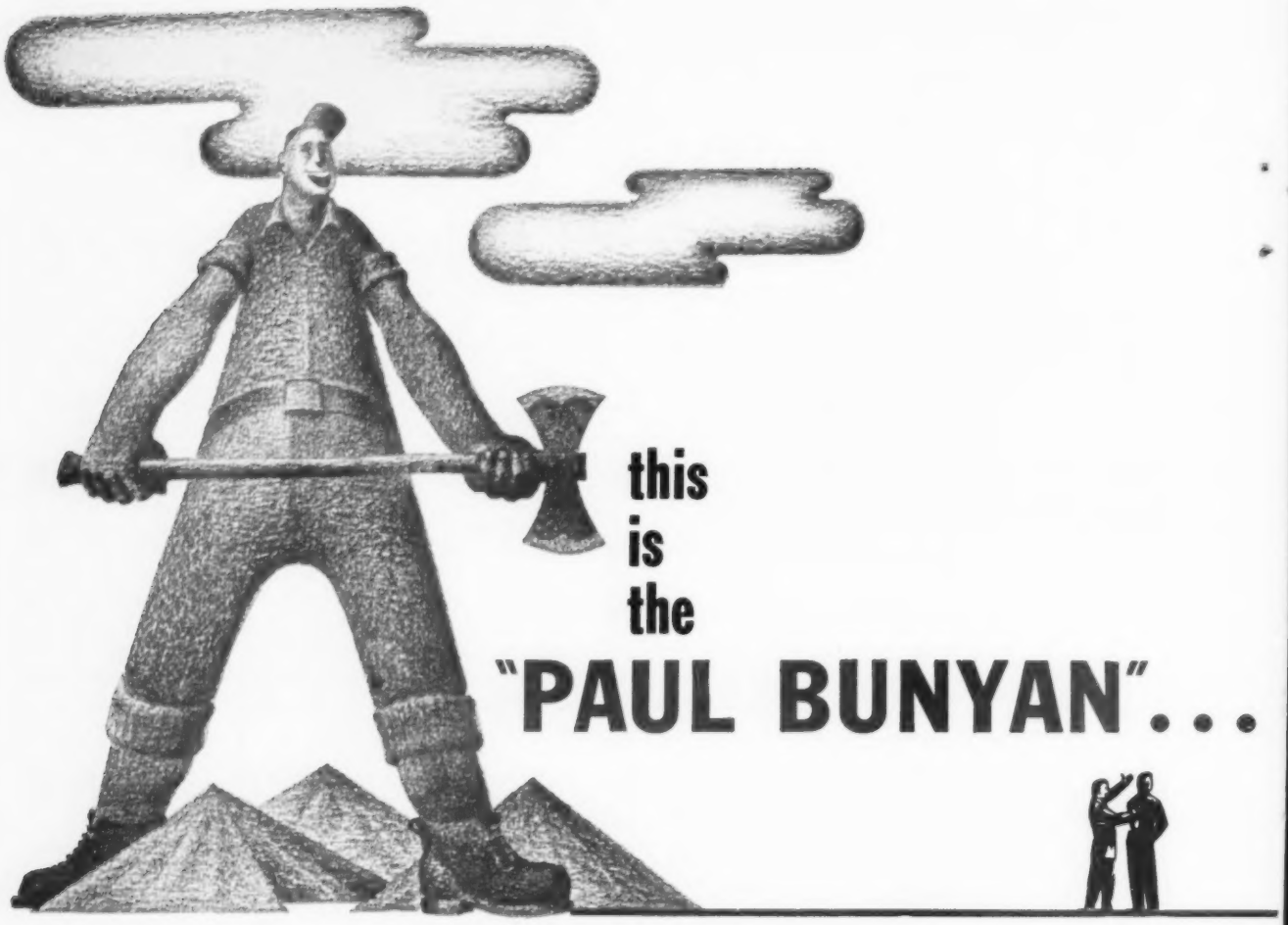
● The operating results show that stiffer eccentrics mean better presses. You cannot find V & O stiffness in just any press you pick up. So users keep their V & O's. Shown are full eccentric and modified eccentric shafts.

Hand-Scraped Accuracies

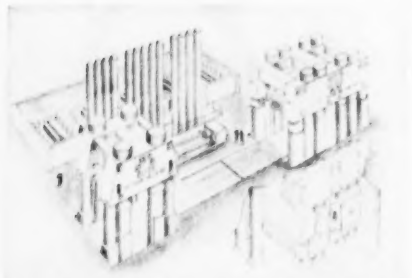
● You will not find hand-scraped slides and bearings in just any press you pick up. But these operations make big differences in press performance. Users want those V & O accuracies to stay in their shops.







this is the "PAUL BUNYAN"...



Twin Press Set-Up: *Schematic shows how Bliss' 35,000 and 25,000-ton presses will be installed.*

Write for the twelve-page Special Issue of the BLISS NEWS LETTER *which describes the Bliss heavy presses in detail.*

And it's in the machining stage now...

Bliss is building this press and another, its 25,000-ton teammate, for the critical USAF heavy press program—a program which promises to speed up production of the one-piece wing spars required by the stresses of sonic and near-sonic speeds.

Instead of today's time-consuming and costly machining of rough billets into single spars, these presses will allow Kaiser Aluminum to take a rough billet, give it a mighty multi-million pound squeeze and mold it into near-finished shape!

Just planning to build monster presses like these brings problems that stagger the imagination. To give you a quick idea: the size and weight of *every* major section had to be limited by the capacity of railroad rolling stock. In fact, in one case the main line of the Pennsylvania RR will have to be lowered five inches to allow under-bridge clearance for the largest of the press sections.

An unusual job in most respects, these presses nevertheless have one thing in common with *all* Bliss presses: *the same creative press engineering.* That's why Bliss, the world's largest press builder, always offers the right press—hydraulic or mechanical—for a given job, no matter what the capacity.

E. W. BLISS COMPANY, CANTON, O.

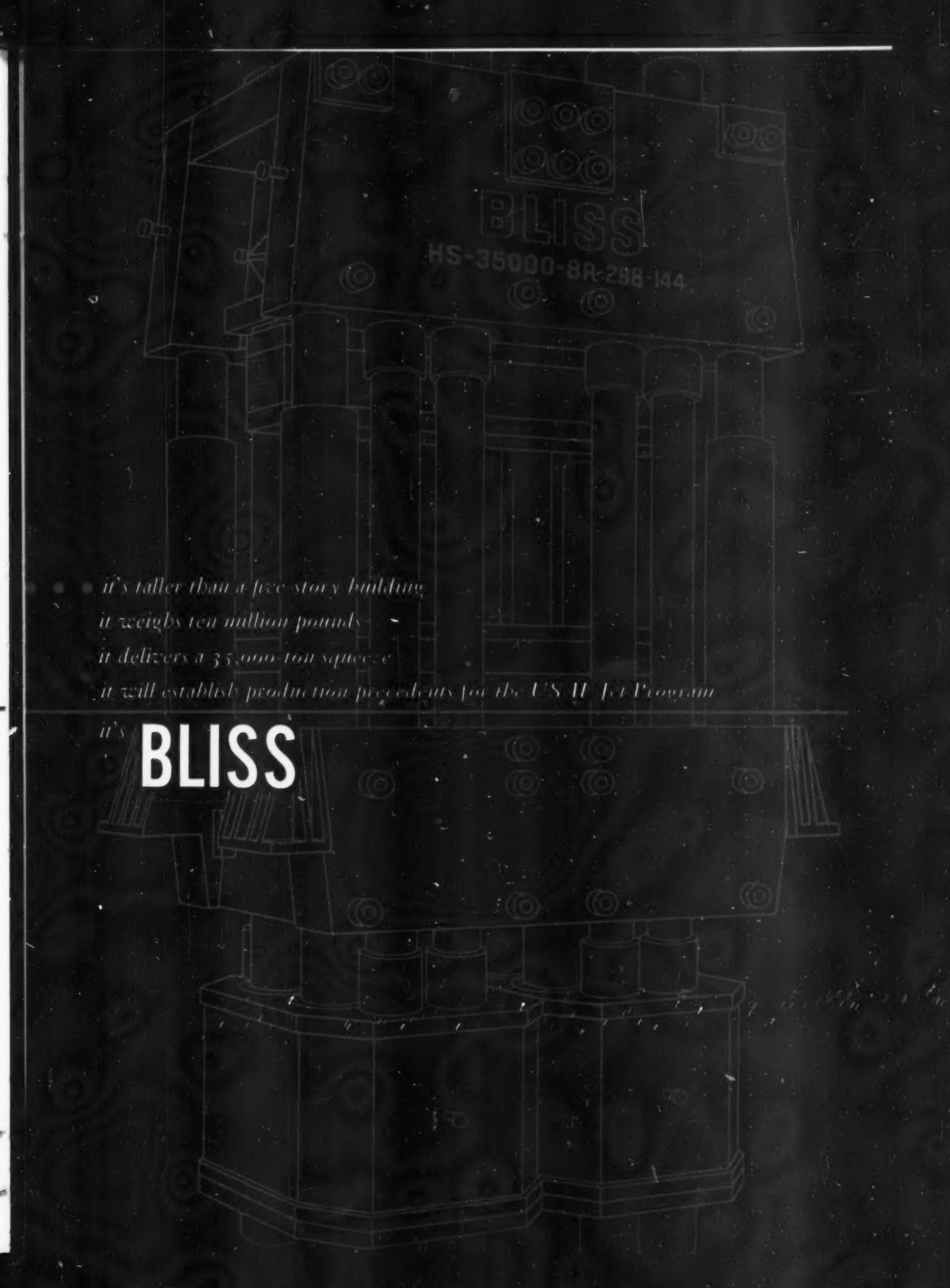
E. W. Bliss (England) Ltd., Derby, England

E. W. Bliss Company (Paris), St. Ouen sur Seine, Paris

U. S. Plants in Canton, Salem and Toledo, Ohio; and Hastings, Michigan

Branch Offices and Dealers throughout the world

Remember: *for Presses, Rolling Mills, Special Machinery—It's* **BLISS**



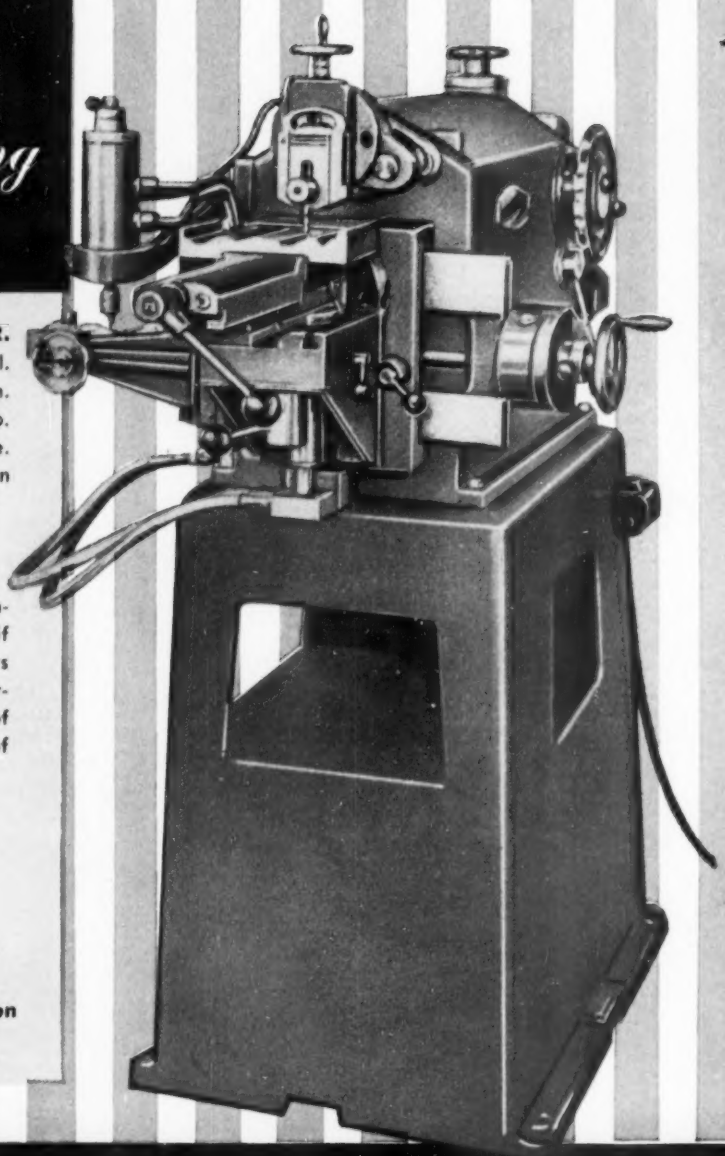
it's taller than a five-story building
it weighs ten million pounds
it delivers a 35,000-ton squeeze
it will establish production precedents for the USAF Jet Program

it's **BLISS**

COPIES TO EXTREME ACCURACY

BARTSCH

Hydraulic Copying Shaper



BARTSCH HYDRAULIC COPYING SHAPER. 6" stroke, 8½" cross travel, 6" vertical travel. Ram speed infinitely variable 0-65 ft. per min. Copies any shape from template at 1:1 ratio. Automatic table feed. Stroke length adjustable. Indexing vise permits shaping work between centers. 2 H.P. motor drive.

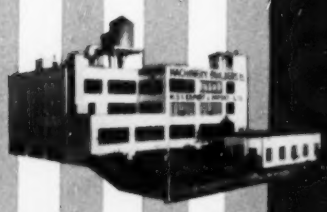
OUTSTANDING FEATURES

Fully hydraulic operation; Copies from any template, ratio 1 to 1, to extreme accuracy; if overloaded no breakage possible as no gears are used anywhere; Simplicity of operation permits use of semi-skilled men; All adjustments of speed and stroke can be made in seconds of time while Shaper is in operation.

- *Guaranteed Service by Trained Staff*
- *Engineering Staff will make recommendations based on your requirements*
- *Spare Parts in Stock*
- *Your Operators Trained*
- *Early Deliveries—Some from Stock*
- *Competitive Prices*
- *Financing and Rental Plans to Meet Your Requirements*

Many More Machines for Every Operation

Write for free illustrated brochure 102, or state your specific requirements.



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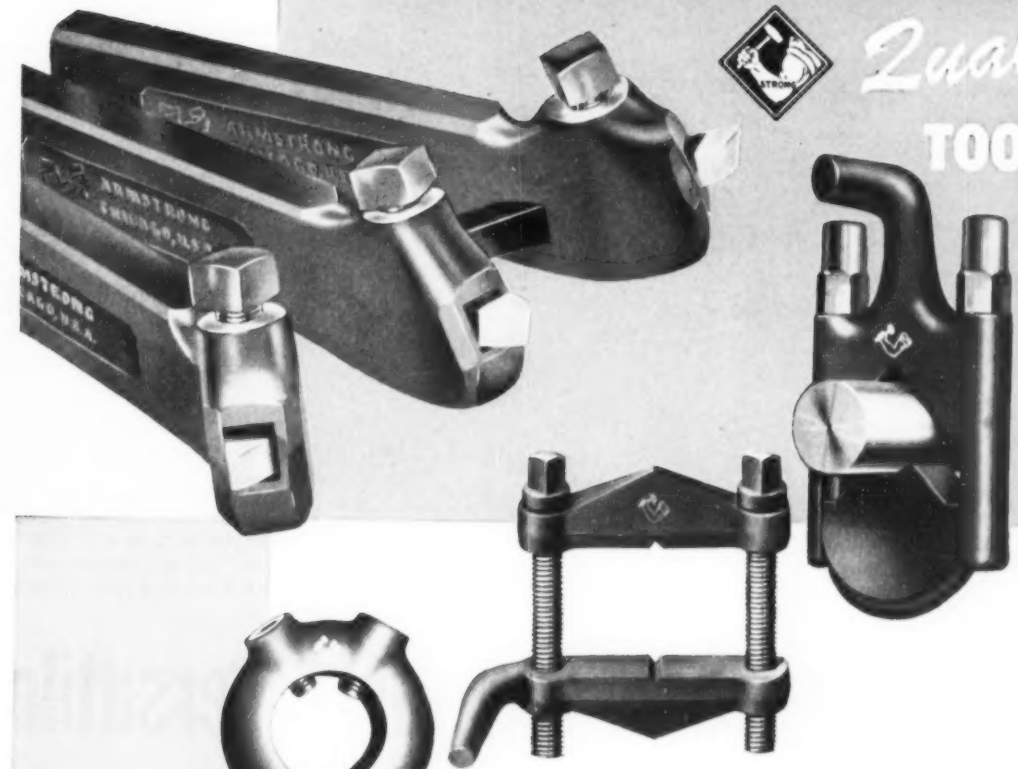
ARMSTRONG

Quality TOOLS



NOT A COST, BUT AN INVESTMENT

That Pays Year After Year . . .

Buy ARMSTRONG TOOL HOLDERS and TOOLS for today's job and they will bring you added profits thru the years. With ARMSTRONG TOOL HOLDERS you will be permanently tooled up for whatever comes, for each is a multi-purpose tool that takes cutter bits ground to many shapes. Each is an efficient tool, refined thru a half century of world wide use. Each has strength beyond any need, extra strength resulting from endless research and the most modern closely controlled manufacturing methods.

ARMSTRONG TOOL HOLDERS are inexpensive too, for they are produced in great numbers. They are instantly available because they are carried in stock by all leading supply houses in sizes and types for every operation on lathes, planers, slotters and shapers; for standard operations on turret lathes and screw machines. They are profitable in use because they permit the highest speeds and heaviest feeds and "Save: All Forging, 70% Grinding and 90% High Speed Steel."

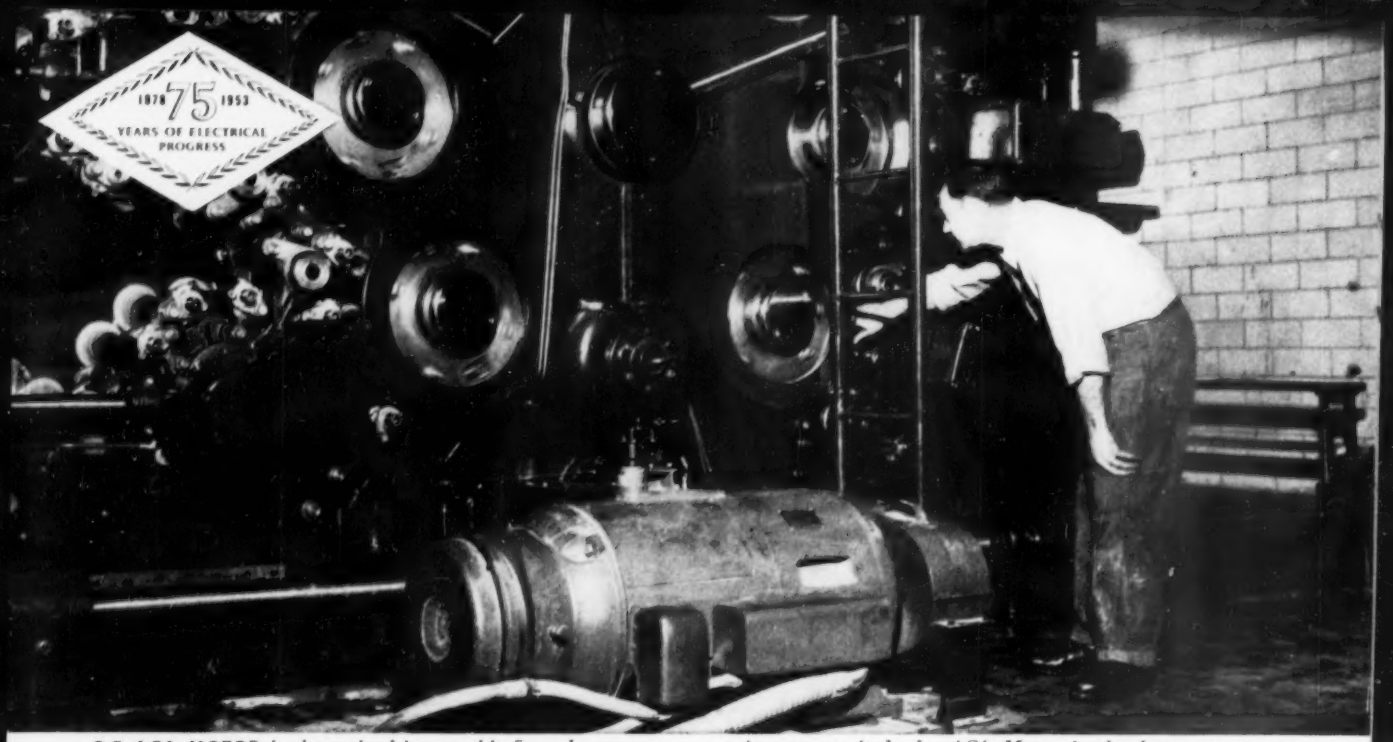
ARMSTRONG Lathe and Milling Machine Dogs are permanent tools too. They are drop-forged from special open hearth steel, are heat treated to extreme stiffness and toughness. They have alloy steel screws hardened at the tip to prevent up-setting and have double life, for hubs are made oversize to permit re-tapping.

ARMSTRONG Quality pays back over and over again. *Write for new S-48 catalog.* It offers many opportunities to conserve profits.

ARMSTRONG BROS. TOOL CO.

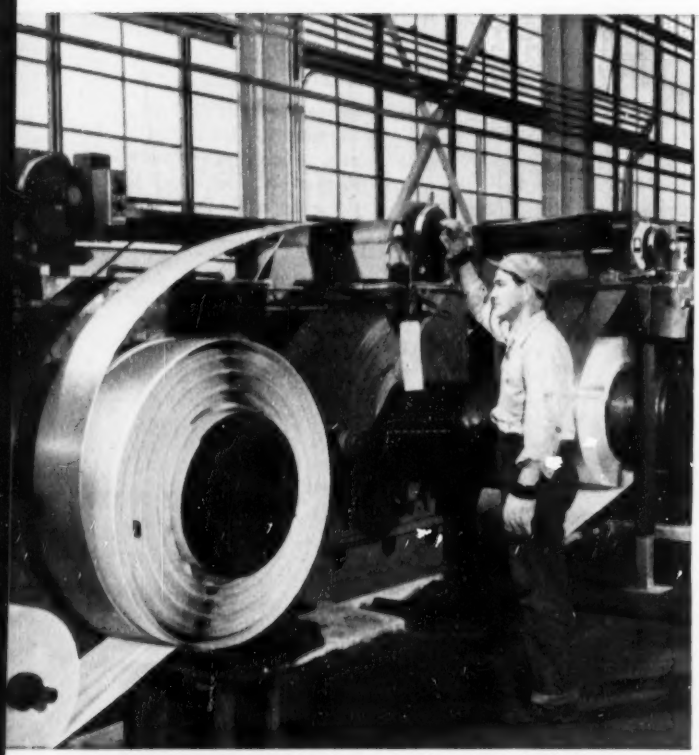
"The Tool Holder People"

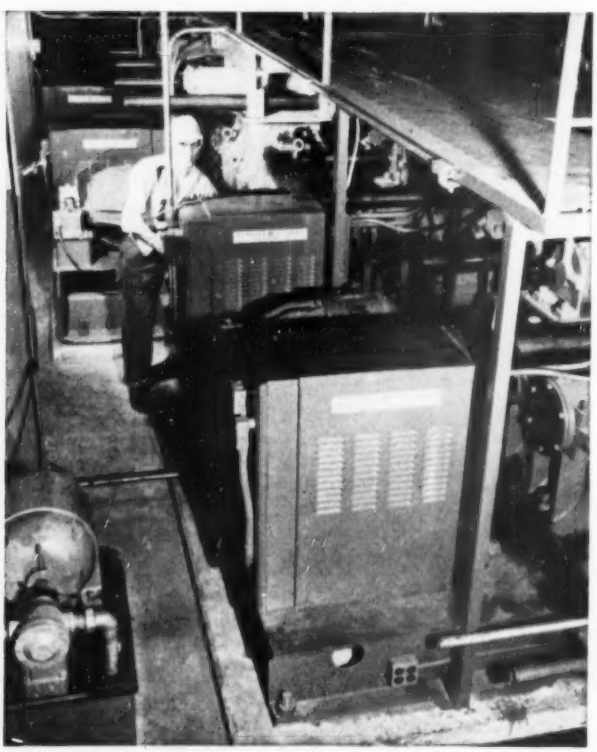
5215 W. ARMSTRONG AVENUE • CHICAGO 30, ILL.



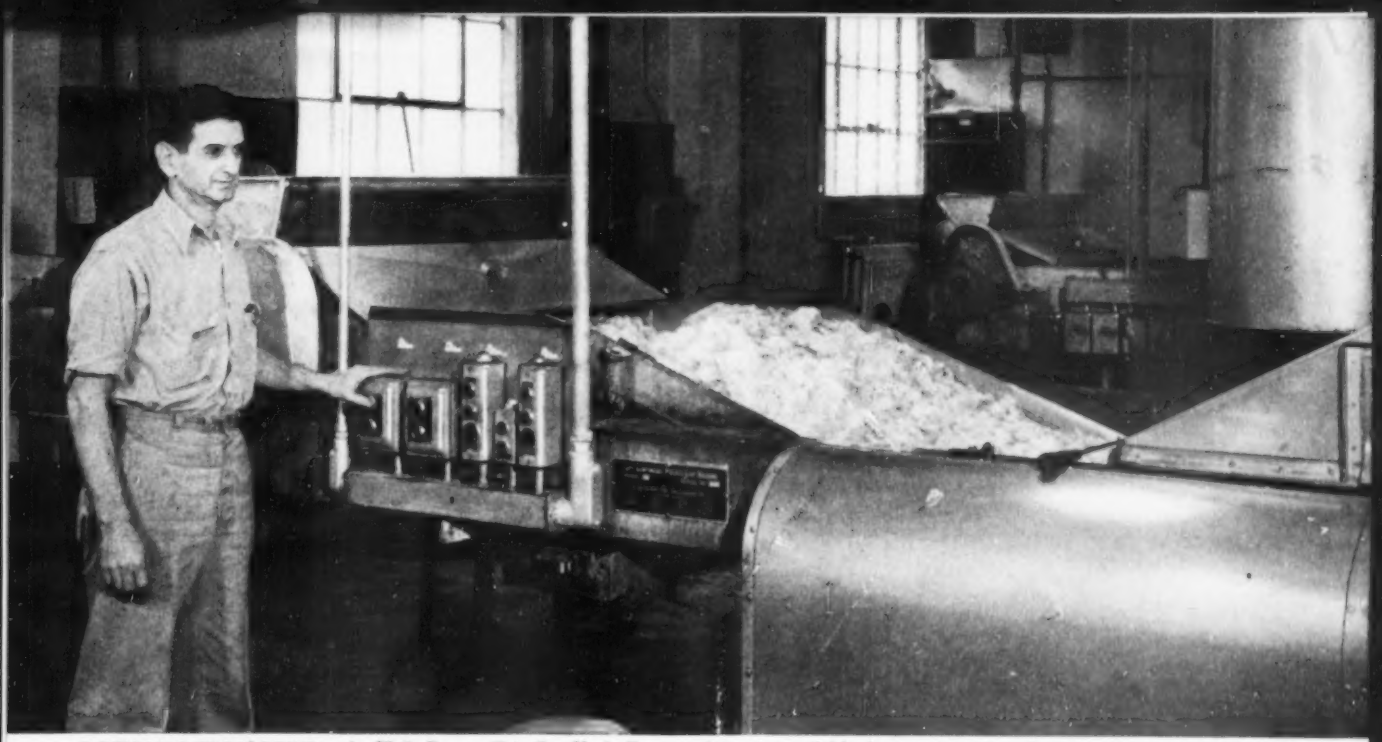
G-E ACA MOTOR is the main drive on this five-color press at Alford Cartons, manufacturers of folding boxes, Ridgefield Park, New Jersey. Working from AC current with no conversion equipment required, the ACA Motor is the low cost way to Adjustable-speed Drive performance. You get stepless speed adjustment within a speed range of from 3 to 1, 6 to 1, and 20 to 1.

Make your machinery more versatile





G-E SPEED VARIATOR boosts winders "spooling" chrome strip steel at Wallingford Steel Co., Wallingford, Conn.—handles all speeds from 5 to 80 feet per minute. G-E Speed Variators, with speed ranges up to 40 to 1, are complete "package" units—available in ratings from 1 to 200 hp. For even greater accuracy and versatility, these drives may include amplidyne or electronic regulators.



G-E THY-MO-TROL® DRIVE at the El-Ge Potato Chip Co., York, Pa., electronically regulates potato chip processing where accurate speed control is extremely important to the finished product. Thy-mo-trol drive is available between 1/40 and 75 hp, offers smooth speed adjustment ranging up to 100 to 1 and can be made to hold regulation as close as ±½% regardless of changes in voltage.

with a G-E Adjustable-speed Drive!

G-E ADJUSTABLE-SPEED DRIVES offer you the chance to get the most from your machinery investment. You can step up production, minimize material waste, improve product quality, and enjoy the ability to produce a greater variety of goods.

THERE IS A G-E ADJUSTABLE-SPEED DRIVE FOR YOU. Whether you need speed regulation within ±½% or ±10% you can get an economical Adjustable-speed Drive from the full G-E line. From the G-E ACA motor which requires but a simple twist of a dial . . . to the G-E Thy-mo-trol drive which permits precise electronically controlled drive speeds . . . General Electric manufactures a drive that will enable you to produce better and more uniform products. Packaged drives are available in sizes from 1/40 to 200 hp. Depending on hp, speed ranges are available from 3 to 1 up to 100 to 1.

FOR FULL INFORMATION consult your nearest General Electric Apparatus Sales Office. Your G-E Sales Representative will be glad to recommend the most economical drive best suited to your operation. For printed information on the complete line of Adjustable-speed Drives, use the coupon.

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You can put your confidence in—

GENERAL ELECTRIC

LET G.E. HELP YOU PICK THE RIGHT DRIVE

Because only General Electric makes **all major types** of electric adjustable-speed drives, it is best qualified to help you select the **right drive.** Send for these informative bulletins.

☐ **A.** This 26-page manual describes **all** four types of drives and where to apply them. Bulletin GEA-5334.

☐ **B.** Lower cost, simplest a-c drive. Bulletin GEA-4883.

☐ **C.** More flexibility, moderate cost. Bulletin GEA-5335.

☐ **D.** Top performance, 1/70—75 hp. Bulletin GEA-5337.

☐ **E.** Top performance, 1-200 hp. Bulletin GEA-5336.

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Please send me the bulletins checked
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—"Helex" End Mills, with their National cutting edges and high helix angles, give you smooth free-cutting operation. Long tool life, too!
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get speed...
safety...
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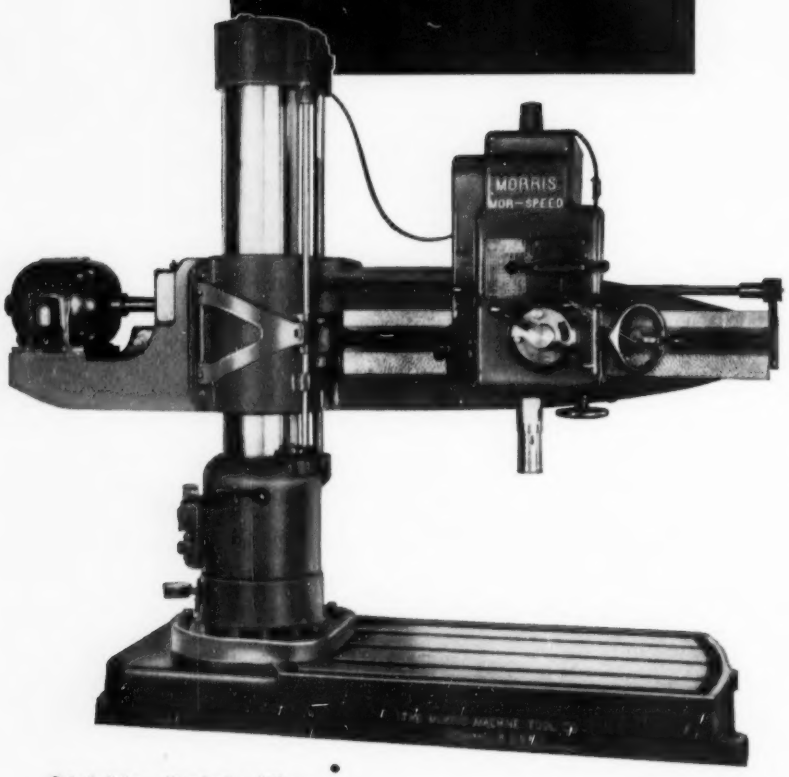
MOR-SPEED
RADIAL DRILLS



completely centralized controls . . .

On a MORRIS Mor-Speed Radial Drill every control is in sight . . . within reach . . . easy to operate fumble free!

The operator makes speed, feed and other adjustments, quickly and easily—concentrates on job, rather than on bending, stepping, stooping or reaching for awkward controls. A wide selection of automatic stops and trips cut time per operation to a minimum. Carefully designed, tested safety devices assure complete protection to machine, operator and work. Alloy steels, modern hardening methods and anti-friction bearings . . . at every wear-vulnerable point . . . plus constant lubrication for all operating parts, protect and maintain precision and make Mor-Speed Radials capable of higher production over longer periods of time.

Find out how MORRIS Mor-Speed Radial Drills can make precision work possible and profitable for you, even under your heaviest scheduling demands.

WRITE FOR BULLETIN NO. 59
Early delivery dates available.

THE MORRIS MACHINE TOOL COMPANY
933 HARRIET ST., CINCINNATI 3, OHIO

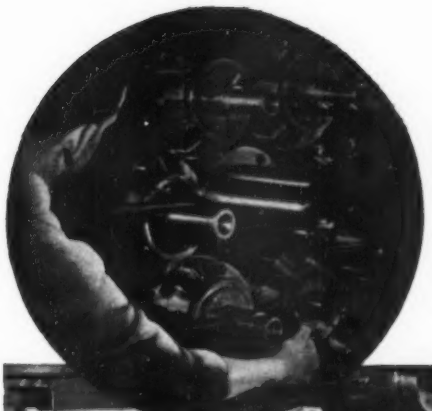
9-inch Column Standard and Heavy Duty models with 3 and 4-foot arms.

11-inch Column Heavy Duty models with 3, 4, 5, and 6-foot arms.

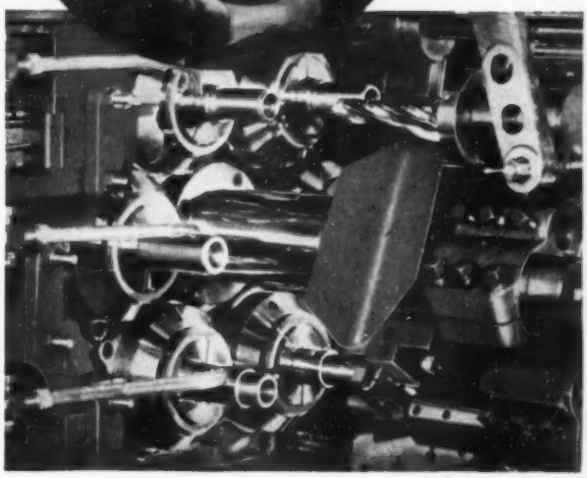
a better product at less cost —with precision PLUS *production*

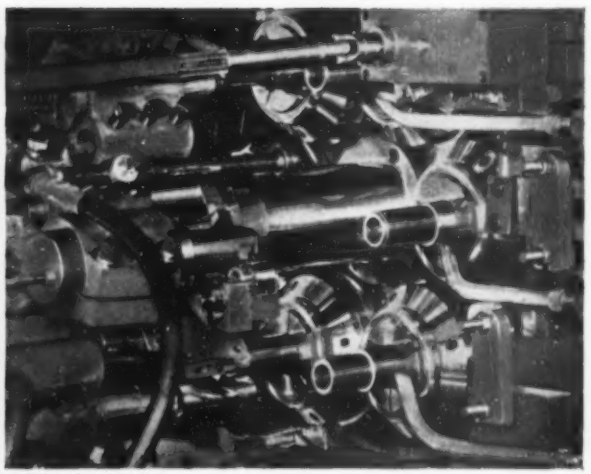
Bullard MOR-SPEED Line

Morris



NO NEED TO "SETTLE" FOR LESS





FRONT AND REAR SIDES OF 2⅝-SIX

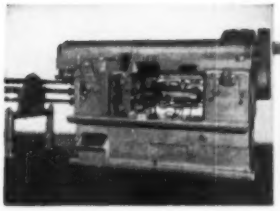
Multiple Spindle Bar Automatics produce more work per square foot of floor space than do other types of metal cutting machine tools. But, when *one* spindle is "down" *all* are "down." It's why dependability will always be the outstanding requirement of the "Automatic."

So many factors are involved in dependability that any weakness in design, engineering, material, or construction, will eventually contribute to higher costs of operation and maintenance.

Part of any new machine's service to the prospective user is the availability of *full* information. No prospective purchaser need "settle" for less. At least it's that way with CONOMATICS.

In producing the piece shown, on a 2⅝-SIX, the eccentric forming attachment (see upper right illustration) combines the well known CONOMATIC facilities of form tool support and "all position" attachment spindle drive.

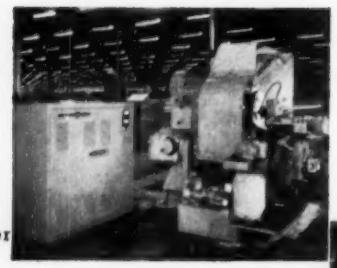
A Comparison of ALL Automatics is in favor of Cone



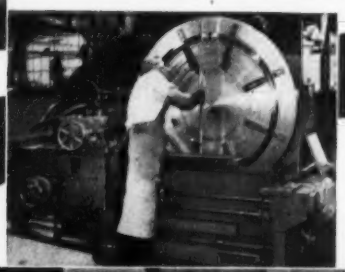
Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

Manufacturers Report on *T* Lathes*

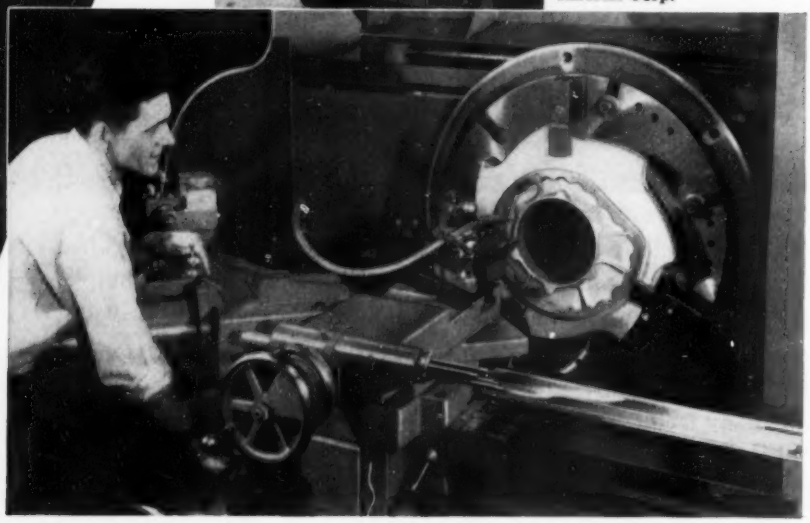
...Excellent Accuracy and Versatility
...Save up to 86% in Time
...Good Output and Design Features
...Best Available



Machining
Jet Engine
Component
Studebaker
Corp.



Machining
Jet Engine
Component
Pratt & Whitney Aircraft, Div. of United Aircraft Corp.



Machining
Supercharger
Diffuser
Hotpoint Co.

T turning large diameter, thin wall, short length components

World leaders in production, have installed, tested and production-proved Lodge & Shipley T Lathes.

T Lathes are designed specifically for thin-wall, short length and large diameter work that characterizes jet engine and other production. These lathes have solved the problem of straight and contour facing, turning and boring parts formerly machined on over-size, over-costly, over-clumsy conventional lathes and boring mills. Far faster, more sensitive and accessible, they save cost, time, floor space and assure required accuracy.

Whatever your requirements or production, there is a T Lathe to cut time and costs on large diameter, short length parts machining. With priority assistance, you may be able now to obtain good delivery. Write for new literature #215 and complete details.

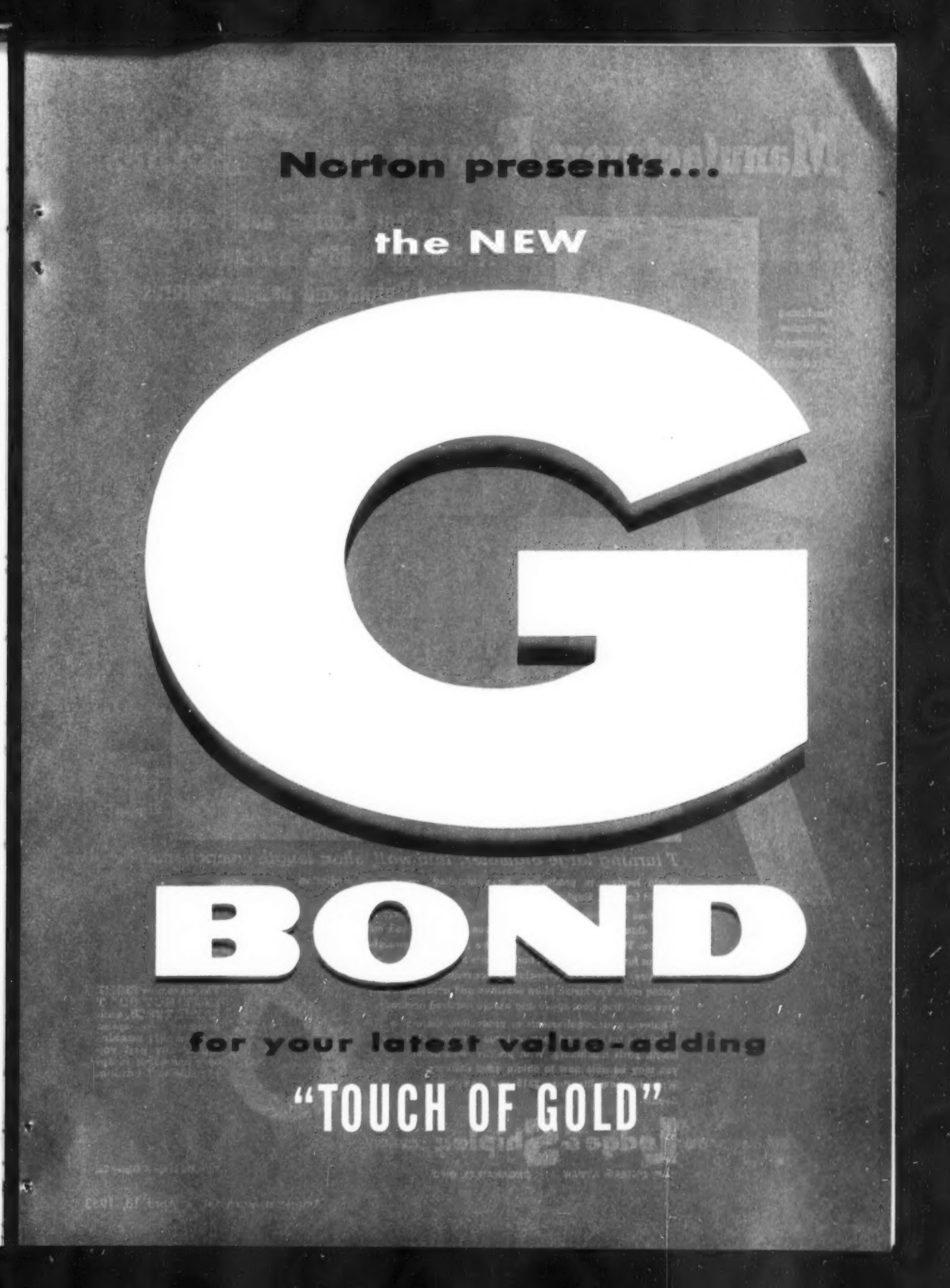
8

There are now EIGHT DISTINCT 60" T LATHE TYPES, each designed to speed and simplify machining of any part you may have that is applicable to T turning.

THE **Lodge & Shipley** COMPANY

3059 COLERAIN AVENUE, CINCINNATI 25, OHIO

*T/M The Lodge & Shipley Co.


Norton presents...
the NEW
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for your latest value-adding
"TOUCH OF GOLD"

He Knows! Operators who have used the new Norton G Bond wheels will tell you there's nothing like them for getting better grinding results faster and easier. Why not get your own operators' verdict on this newest "Touch of Gold"?

ANNOUNCING

the greatest grinding wheel achievement in 45 years

The NEW Norton

G BOND

The new Norton vitrified G Bond, now ready after years of continuous development, is designed for a wide range of precision and semi-precision grinding.

The physical properties of the G Bond are so ideally suited to these types of operations that wheels bonded with it show a marked improvement — from every performance angle — over any wheels you have ever used before. In fact, the new G Bond offers so many benefits to so many grinding wheel users that it stands out as an important milestone.

The New G Bond's Secret For More Efficient Cutting Action

The G Bond holds ALUNDUM* abrasive grains firmly while they fracture, so that they keep sharp and remain in the wheel until they have done their full quota of work. Thus the wheel's grinding surface is kept at constant peak efficiency. An added advantage is that G Bond wheels may be dressed or trued more easily, and without disturbing the underlying bond.

How G Bond Wheels Outperform All Others

Performance is the payoff. And once you try G Bond wheels you'll know that here you've found production tools that will do *more* for you, do it *better,* and do it for *less.* Exceptional performers in every detail of operation, G Bond wheels: Do more work per wheel . . . Cut freer, cooler, faster . . . Dress easier . . . More pieces per dressing . . . Cover a wider range of jobs . . . Hold their shape — better for form grinding . . . Hold corners better . . . Are ideal for crush dressing.

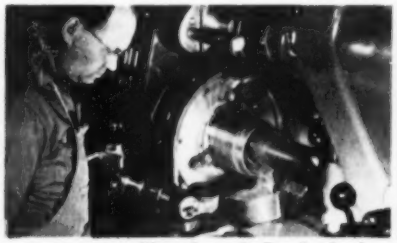
Typical jobs where G Bond wheels will save you time, labor and money

CYLINDRICAL • CENTERLESS
SURFACE • INTERNAL
GEAR • FORM AND THREAD GRINDING
TOOL AND CUTTER • SAW GUMMING

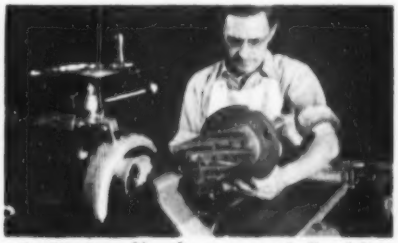
3 ways you can spot the new G BOND'S "TOUCH OF GOLD"

Every time you put a Norton abrasive or abrasive product to work, you add the "Touch of Gold" that increases the value of your own products. You get proof of this in better grinding results and in the way Norton products act on the job. With the new G Bond wheels this proof is particularly easy to recognize. The illustrations show you three striking ways you can job-prove the G Bond's vital "Touch of Gold" . . . the value-adding production step that helps your profits.

By Watching. Note the new G Bond wheels' continuous, even spark stream that could only come from a uniform cutting action — the "Touch of Gold" at its best.



By Listening. Note how G Bond wheels grind with the steady swish-h-h of an extra-smooth performer applying the "Touch of Gold". No harsh grinding noise.



By Checking. Note how every grinding job you do with G Boad wheels — general purpose, high production, or precision — measures up . . . has the "Touch of Gold".

Your Norton Distributor

will be glad to arrange a test of all types of the new G Bond wheels — in regular, 19, 57, 32 or 38 ALUNDUM abrasive — in your own plant. Or you can write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

NORTON
ABRASIVES

Making better products to make other products better

*TRADE MARK REG. U.S. PAT. OFF. AND FOREIGN COUNTRIES

Your Norton Distributor is your Headquarters for the "TOUCH OF GOLD"

Your Norton Distributor is a good deal more than just a supplier of top quality production tools. His services are many and varied — and every one of them is planned to lighten your own work and save you money. For example:

- In ordinary grinding problems, such as correct wheel selection or maintenance, he can give you the sound advice that comes from long, practical experience plus training in the Norton School of Grinding.
- If your problems are unusual, he will gladly call in a Norton Abrasive Engineer for expert technical consultation.
- He is careful to keep his stocks adequate for the needs of your area. Aiding him in this are five big Norton warehouses in key cities, in addition to huge stocks at Worcester.
- In emergencies you can count on him for quickest possible deliveries, to avoid costly production delays.
- He is your direct connecting link with the entire Norton organization, world's largest manufacturers of abrasives and the leaders in abrasive research and development.

Your Norton Distributor is *the* man to contact for the world famous abrasive products and service — that will add the cost-cutting, value-adding "Touch of Gold" to all your grinding jobs.

See your Norton Distributor about the new **G BOND** *wheels — soon!*

NORTON COMPANY

WORCESTER 6, MASS.

New York, Chicago, Detroit, Cleveland, Philadelphia, Pittsburgh, Hartford

Distributors in all principal cities — See your classified telephone directory.
Export: Norton Behr-Manning Overseas Inc., Worcester 6, Mass.

NORTON
ABRASIVES

Making better products to make other products better

PRINTED IN U. S. A.

VV-1488

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT Calol O.C. Turbine Oil

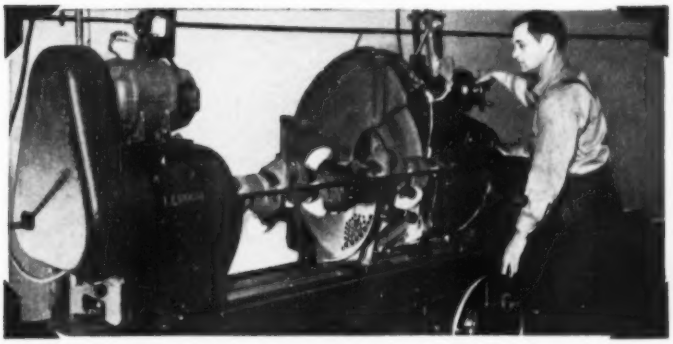
APPLICATION Hydraulic medium

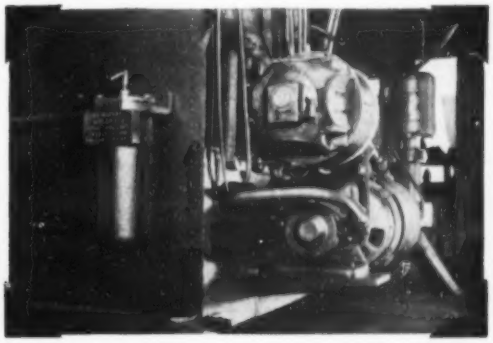
UNIT Control on hydraulic grinder Landis type C – 36 in. wheel

SERVICE Crankshaft and cylinder grinding

FIRM Crankshaft Co, Los Angeles

Inhibited oil saves $1000 per year in "down time"!





CALOL O.C. TURBINE OIL–15 has operated the hydraulic feed on this heavy-duty grinder for 5 years without the formation of any sludge or corrosion in the system. With the oil used previously, it was necessary to make a complete system clean-up twice a year at a cost each time of about $500 in labor and work-hours lost. The filter and pump (right) are checked and cleaned every 6 months. Only leakage make-up was added during the five years to the original charge of Calol O.C. Turbine Oil.

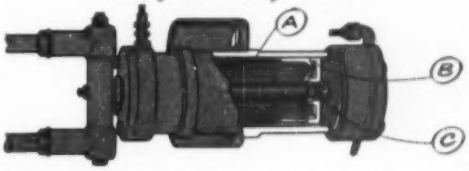
CRANKSHAFT CO., owned by Mr. A. W. Alexander (above), specializes in precision grinding, makes many of the shafts used by top racing drivers. Mr. Alexander says, "By keeping the feed control on my machine working smoothly, Calol O.C. Turbine Oil helps us to turn out finer work."

REMARKS: Calol O.C. Turbine Oil is valuable in many services where even minor oxidation or corrosion may cause trouble. It resists the action of both fresh and salt water. Calol O.C. Turbine Oil comes in several viscosity grades to meet all operating conditions.

CALOL

TRADEMARK "CALOL" REG. U.S. PAT. OFF.

How Calol O.C. Turbine Oil cuts costs in hydraulic systems



Used as the hydraulic medium in feeds and lifts of any kind, Calol O.C. Turbine Oil will not form carbon or foam excessively.

A. Contains very effective oxidation inhibitor—will not deteriorate and plug lines and retard action of cylinders.

B. Corrosion inhibitor prevents rusting and pitting—has high metal-wetting ability.

C. Separates readily from water or other contaminants—dirty oil may be reclaimed easily...charge lasts indefinitely, leakage only cause for replacement.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

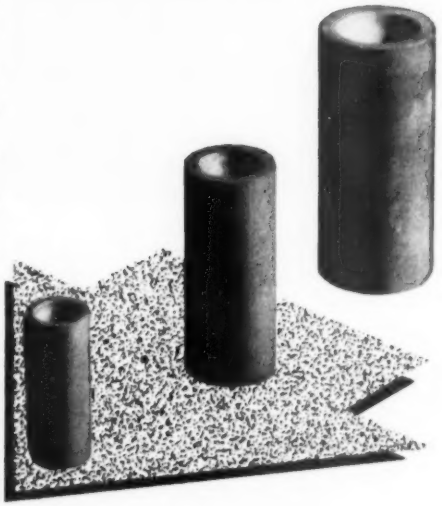
STANDARD OIL COMPANY OF CALIFORNIA
225 Bush Street • San Francisco 20, California

THE CALIFORNIA COMPANY
P. O. Box 780 • Denver 1, Colorado

STANDARD OIL COMPANY OF TEXAS
P. O. Box 862 • El Paso, Texas

THREE REAL REASONS WHY

you should use the NORBIDE Pressure Blast Nozzle:

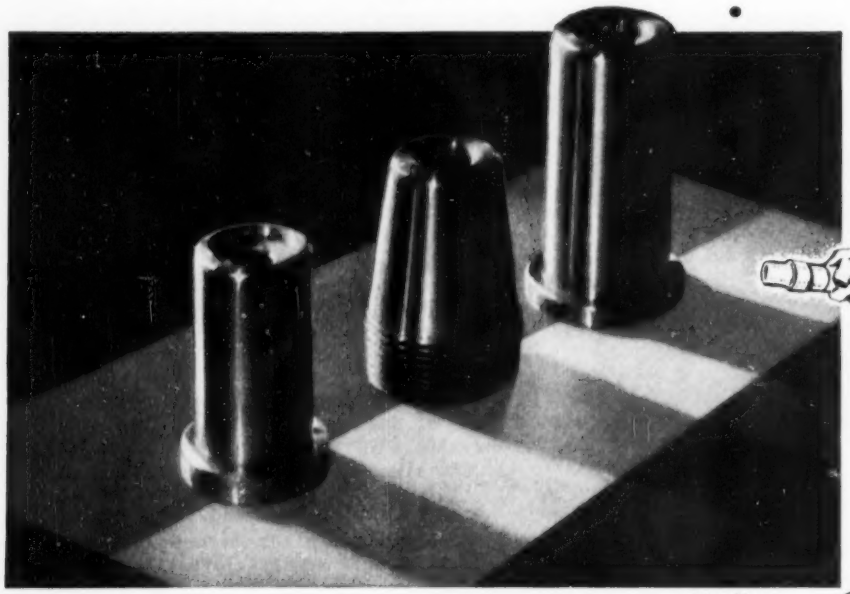


1. More service per dollar cost (750 hours silica sand — 1500 hours steel grit or shot). Norton guarantees this minimum service.

2. Decreases air consumption from 10 to 20 percent as compared with iron nozzles.

3. Maintains stream contour and abrasive velocity.

NORTON COMPANY
WORCESTER 6, MASSACHUSETTS



Only the diamond is harder than Norbide

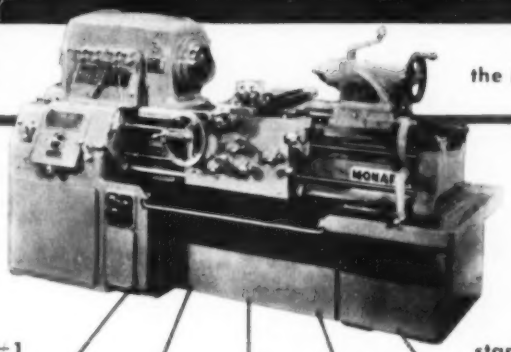
NORTON

Making better products to make other products better

HERE'S YOUR IDEA ORGANIZATION CHART

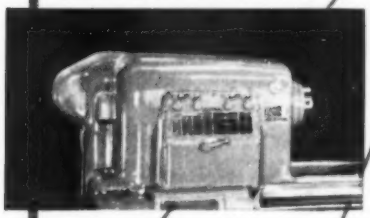
for Small Lot Production and Maintenance

here's the basic design—
in 13", 16" and 20" swings

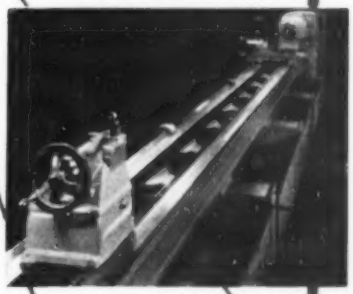


the Monarch series 60 lathe

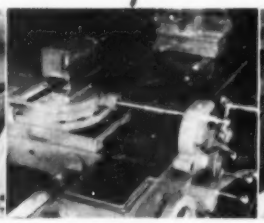
standard variation #1
series 60 plus—swing models



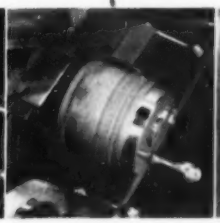
standard variation #2
series 60 long bed models



multiple positive carriage stop

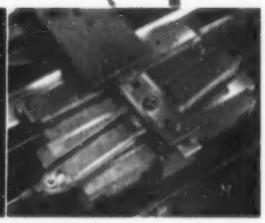


ball turning rest



micro-gage dial

spindle nose chucks and collets



anti-friction bearing taper attachment

AND HERE ARE TYPICAL MONARCH SERIES 60 ACCESSORIES

This, of course, gives you only a partial idea of the great versatility of the Monarch Series 60 —available both as an Engine and a Toolmaker's Lathe. But it does indicate the ease with which the competent basic model can be customized to meet your requirements beyond those served by our standard design. It doesn't show *all* the accessories—the real inside story of Monarch specifications and construction—or the Monarch Heavy Duty Line with added power and swing. For the whole story, you'll want the illustrated, detailed Booklets that we have prepared. Just fill in the coupon, indicating your special interests ... *The Monarch Machine Tool Co., Sidney, Ohio.*

Monarch
ACCURACY • ECONOMY • LONG LIFE
TURNING MACHINES

FOR A GOOD TURN FASTER...TURN TO MONARCH

THE MONARCH MACHINE TOOL COMPANY, SIDNEY, OHIO

Gentlemen: Please send me without obligation the following Complete Booklets.

- ☐ Booklet No. 1113—Monarch Series 60 Lathes
- ☐ Booklet No. 1208—Monarch Heavy Duty Lathes

NAME _____ TITLE _____

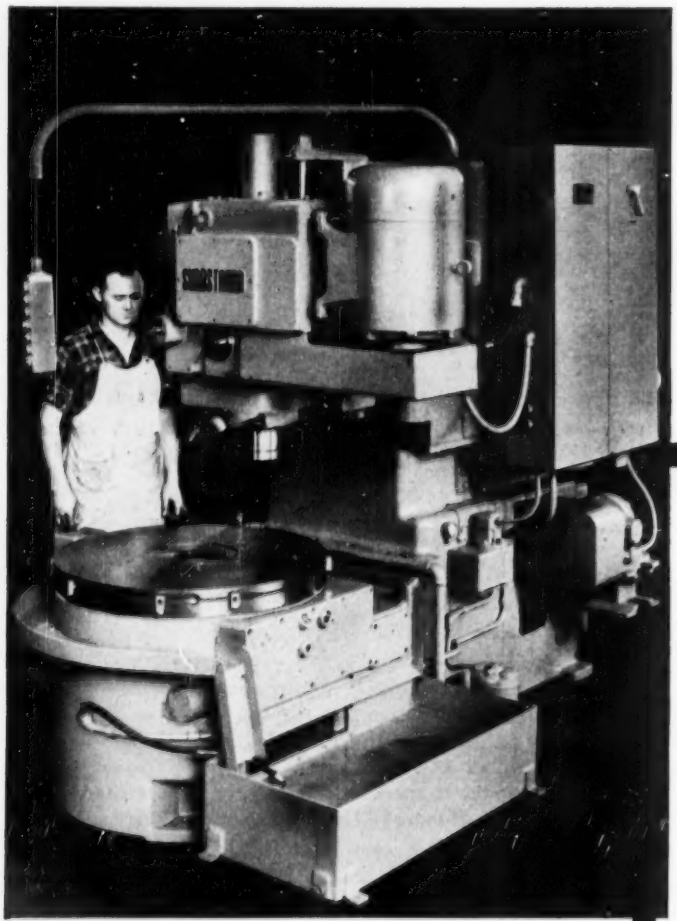
COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

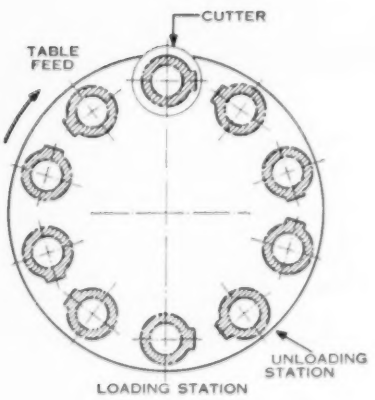
Check These Time Saving Possibilities of SUNDSTRAND Rotary Milling Machines

Sundstrand standard vertical rotary Rigidmil milling machines have many possibilities for solving production milling problems. They can be furnished with one or multiple spindles. In all cases loading and unloading time is eliminated. Check into the possible application of a Rotary Rigidmil to your production milling. A Sundstrand engineer will be glad to help. There is no obligation for this service.



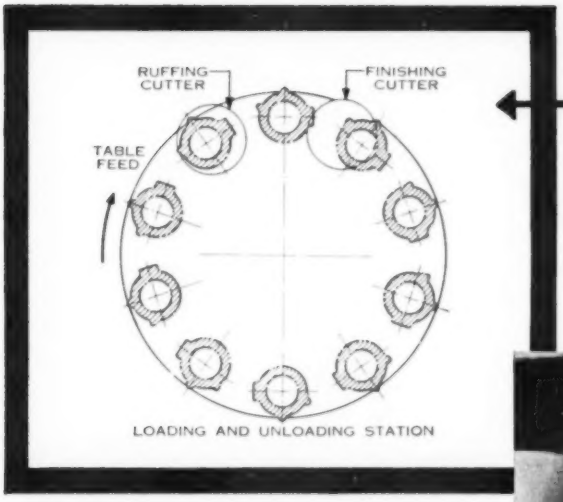
Single Spindle Applications

Photo and drawing to the left illustrate the design and operation of the single spindle machine. It is made in two sizes, 36″ or 48″ diameter rotary table. It has a 25 hp vertical head and can be furnished with either power or manual feed for cross positioning of the head carrier. Head is mounted on vertical ways for manual positioning. Machine can be provided with power elevating device for positioning of head or for automatic cutter retraction.



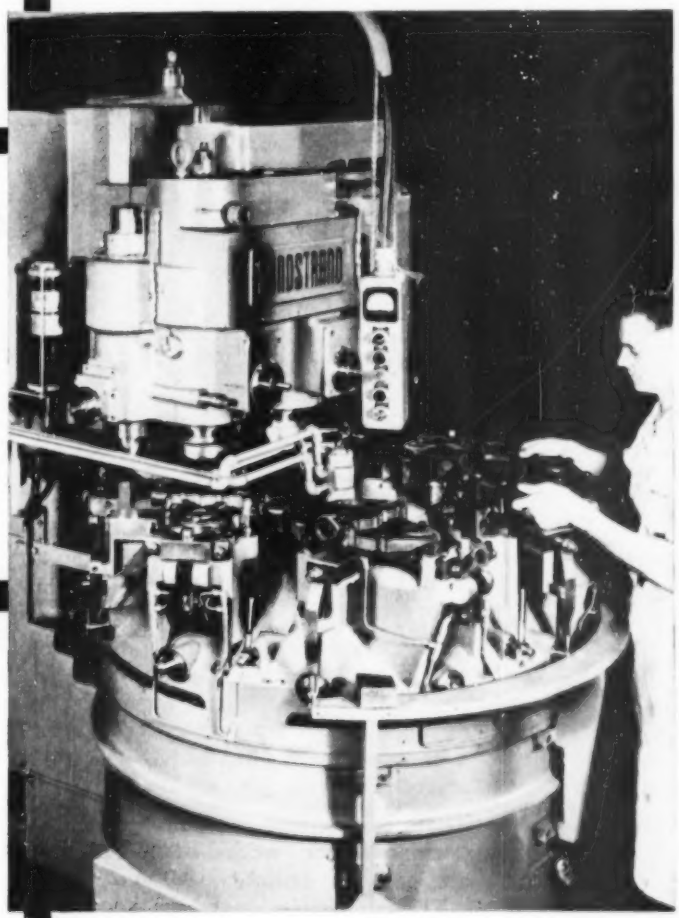
SUNDSTRAND

RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT



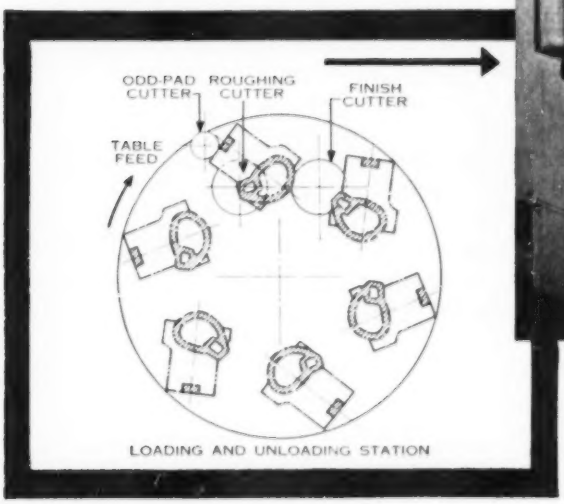
Two Spindle Applications

Basically the two spindle machine is the same as the single spindle rotary Rigidmil. The drawing to the left indicates how both rough and finish milling cuts can be made simultaneously. As in the case of all rotary Rigidmils, loading and unloading time is eliminated—operator loads and unloads while cuts are in progress.



Multiple Spindle Applications

Photo to the right illustrates a special tooling job on a 3 spindle rotary Rigidmil. In this installation, one cutter ruff mills the large pad, a second cutter finish mills this same pad, and the third cutter takes one cut on a small pad at a different depth — all with one clamping of the part. As in the other applications, operator merely loads and unloads the workpiece. Machines with four or more spindles can be supplied to meet the requirements of the job.



FREE DATA is available on Sundstrand Rotary Rigidmils or other time saving Sundstrand milling machines. Ask for bulletin 130.

SUNDSTRAND

SUNDSTRAND
Machine Tool Company
2533 Eleventh St. Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES • SPECIAL MILLING AND TURNING MACHINES

. . . *but*
Experience Cannot be Copied

More than a quarter-century ago MARVEL invented and basically patented the MARVEL High-Speed-Edge Hack Saw Blade—the UNBREAKABLE blade that increased hack sawing efficiency many-fold.

Every MARVEL Hack Saw Blade ever sold has been of that basic welded high-speed-edge construction, with constant improvements from year to year, as EXPERIENCE augmented the "know-how" . . .

MARVEL is not "tied" to any single source of steel supply, and has always used the best high speed steels that became available from time to time as metallurgy progressed. When-as-and-if finer steels are developed—and are proven commercially practical for welded-edge hack saw blades—MARVEL will use them, regardless of cost or source . . .

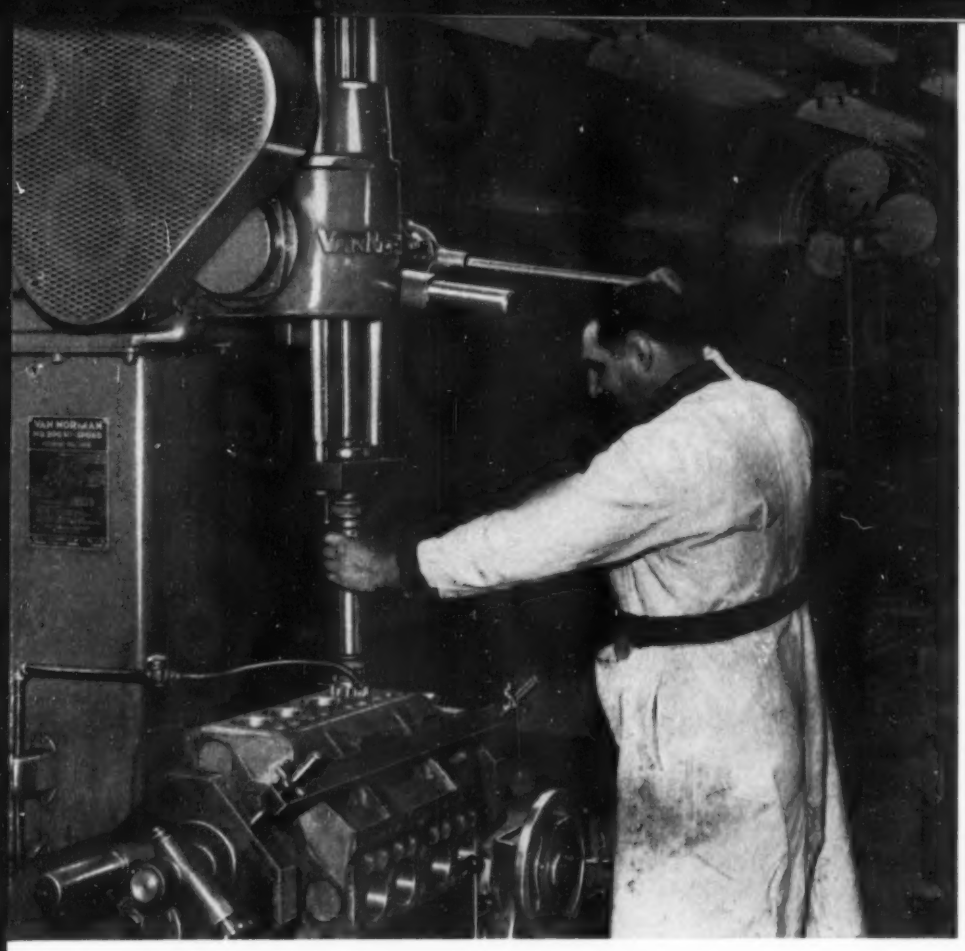
There is only one genuine MARVEL High-Speed-Edge! All other "composite" or "welded-edge" hack saw blades are merely flattering attempts to imitate — without the "know-how" of MARVEL EXPERIENCE . . .

Insist upon *genuine* MARVEL High-Speed-Edge when buying hack saw blades—and be SAFE, for you can depend upon MARVEL. They have been "tested", "pre-tested", and "re-tested" by thousands of users for more than a quarter-century!

MARVEL *Metal Cutting* SAWS

Better Machines-Better Blades

ARMSTRONG-BLUM MFG. CO. · 5700 Bloomingdale Ave. · Chicago 39, U.S.A.



Better honing results from start to finish with...

STANICUT
TRADE MARK
Cutting Oil

A midwest metalworking company—rebuilder of a popular automobile engine—had a cutting oil problem. On the honing operation, shown above, the finish obtained on engine cylinders did not measure up to the high quality desired by that firm. Various honing oils were tried without measurable improvements.

The problem was put to a Standard Oil cutting oil specialist. He recommended the use of STANICUT Oil No. 62 FC, a light-colored, light-bodied cutting oil that contains the correct proportion of extreme-pressure and friction-reducing ingredients. From every angle, STANICUT has proved ideal for the job. The desired finish has been obtained on the cylinders. Tool life has been greatly increased. Oil consumption has been reduced.

Whatever your machining operation, the Standard Oil cutting oil specialist serving your area of the Midwest has the cutting oil that will meet your needs. He has the experience and special training necessary to help you get better cutting oil results. How you can get his help easily and quickly is explained at the right. Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

What's YOUR Problem?

J. E. Weston, of Standard Oil's Kansas City office, is the lubrication specialist who helped this metalworking company solve a "finish" problem on the honing operation described at the left.

Like all of the many Standard lubrication specialists located throughout the Midwest, he has the experience and special training necessary to analyze his customer's needs. Like all of Standard's lubrication specialists, he is close at hand and therefore able to give his customer on-the-spot assistance.

You can reach the lubrication specialist serving your area of the Midwest by phoning your local Standard Oil office. He will be glad to discuss your operations and with no obligation to you. There may be savings for you in the benefits offered by such outstanding cutting oils as:

STANICOOL HD Soluble Oil — Because it contains additional compounding, this heavy-duty soluble oil possesses not only the cooling ability of an emulsion but also the ability to give better tool life and finer finishes than can be obtained with a conventional soluble oil.

STANOSTAMP Compounds — Here are three established products for stamping or heavy drawing operations of either low-carbon or alloy steels. Water can be added to these paste compounds to provide the most economical applications. STANOSTAMPS offer maximum protection for dies and work. These compounds can be removed readily in conventional washing equipment.

STANDARD OIL COMPANY

STANDARD *(Indiana)*

Announcing

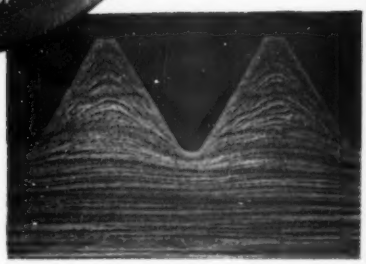
the new "FETTE" PATENT thread rolling head

self-opening

Exclusively by
NATIONAL ACME

- more accurate
- stronger
- smoother
- cheaper

and 5 times faster than die head thread chasing



This new precision method of chipless thread forming embraces features resulting in economies to an extent found in no other tool.

The method produces a highly densified thread surface, wear resistant and exceptionally smooth. Feed of work follows lead of thread—no lead screw or follow-up cam required.

Rolling speeds are equivalent to turning speeds of same materials with high speed tools. Many thousands of linear feet can be rolled with one set of thread rolls.

Annular grooved rolls are positioned in plates in the head and plates are not changed for standard coarse or fine pitch of same thread form. Fine diametric adjustment is provided.

Further economies result in the small initial purchase price of the head as against special single purpose thread rolling machines.

Both revolving or non-revolving heads are suited to all horizontal or vertical machines. Currently built in 3 standard sizes covering range $\frac{1}{4}$ to $\frac{3}{4}$" National coarse or fine straight threads. Other sizes and forms of application.

Material rolled flows in an axial direction so that the thread is generated ahead of the rolls causing metal to flow to the full depth of thread, also eliminating broken grain structure at crest of thread.

Manufactured and sold in U. S. A. only by the makers of NAMCO CIRCULAR CHASER SELF OPENING VERS-O-TOOL HEADS AND COLLAPSIBLE TAPS

The NATIONAL ACME COMPANY

170 EAST 131 STREET • CLEVELAND 8, OHIO

Pressure Processing

. . . whoever uses it in their production is a customer or potential customer of **H-P-M**

Rapid-Fire . . . Accurate . . . Dependable SHELL FORGING calls for H-P-Ms!

Piercing, bottoming, drawing, nosing and living up to strict governmental production requirements are all in a day's work for H-P-M shell forging installations like this one at J. B. Beaird Company, Inc., Shreveport, Louisiana.

If your planning calls for forgings . . . H-P-M's proven ability to reduce scrap loss, save material and cut machining time are three good reasons why you should talk shop with an H-P-M engineer. His experience and assistance will be of real value to you at the planning stage. Write today!

HPM

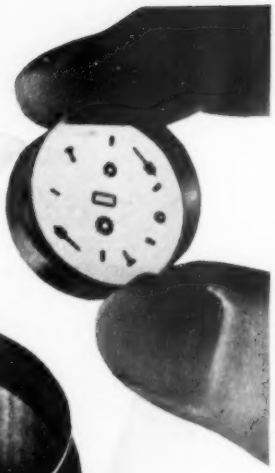
THE HYDRAULIC PRESS MFG. CO.

1002 Marion Road, Mount Gilead, Ohio, U. S. A.

Presses for Every Pressure Processing Application

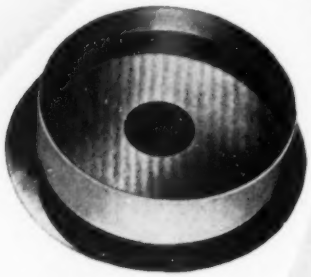
Tiny?

Yes! The No. 11 Blanchard Surface Grinder grinds these ladies' watch gears, pinions and ruby bearings flat and parallel, and to a dimension tolerance of .0002".



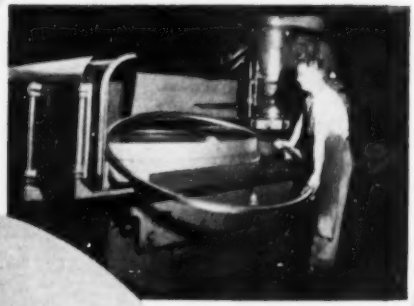
Smooth?

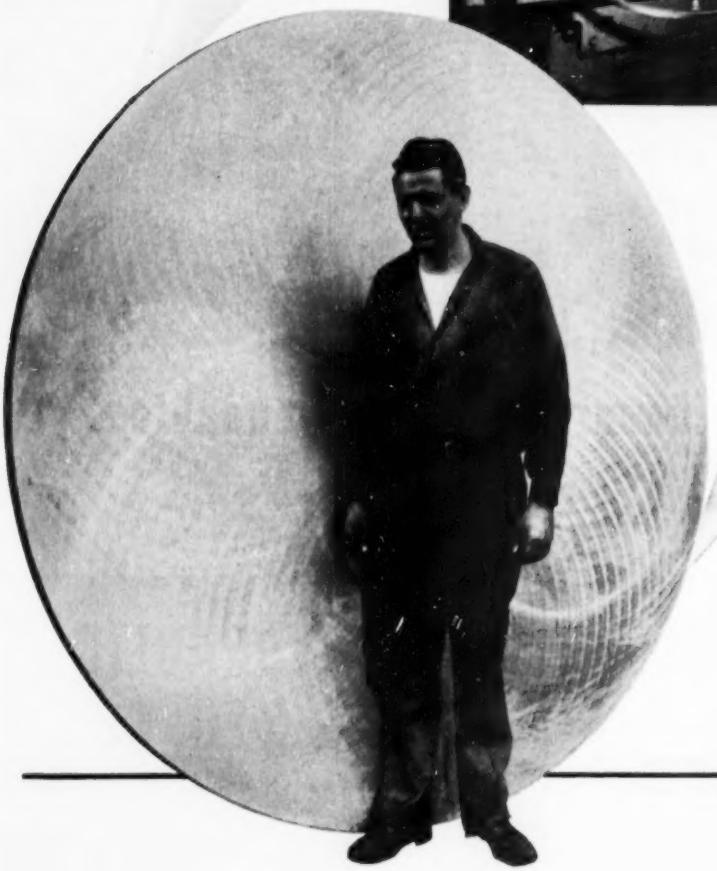
Of course! The Blanchard No. 11 finished this refrigerator plate, seen through an optical flat, to 3 micro inches and flat within 1 light band (.0000118").



Accurate?

Sure . . . and easy, too! This Blanchard grinds 84" forged steel rings flat within .0002", parallel to .0002", dimension tolerance of ±.0005", and with surface finish of 4 micro inches.





Tremendous?

Yes . . . but fast! This 88" diameter cast-iron plate was ground on a No. 42-72-84 Blanchard in 3½ hrs., floor to floor. ¼" of stock—1520 cu. in.—380 lbs. was removed.

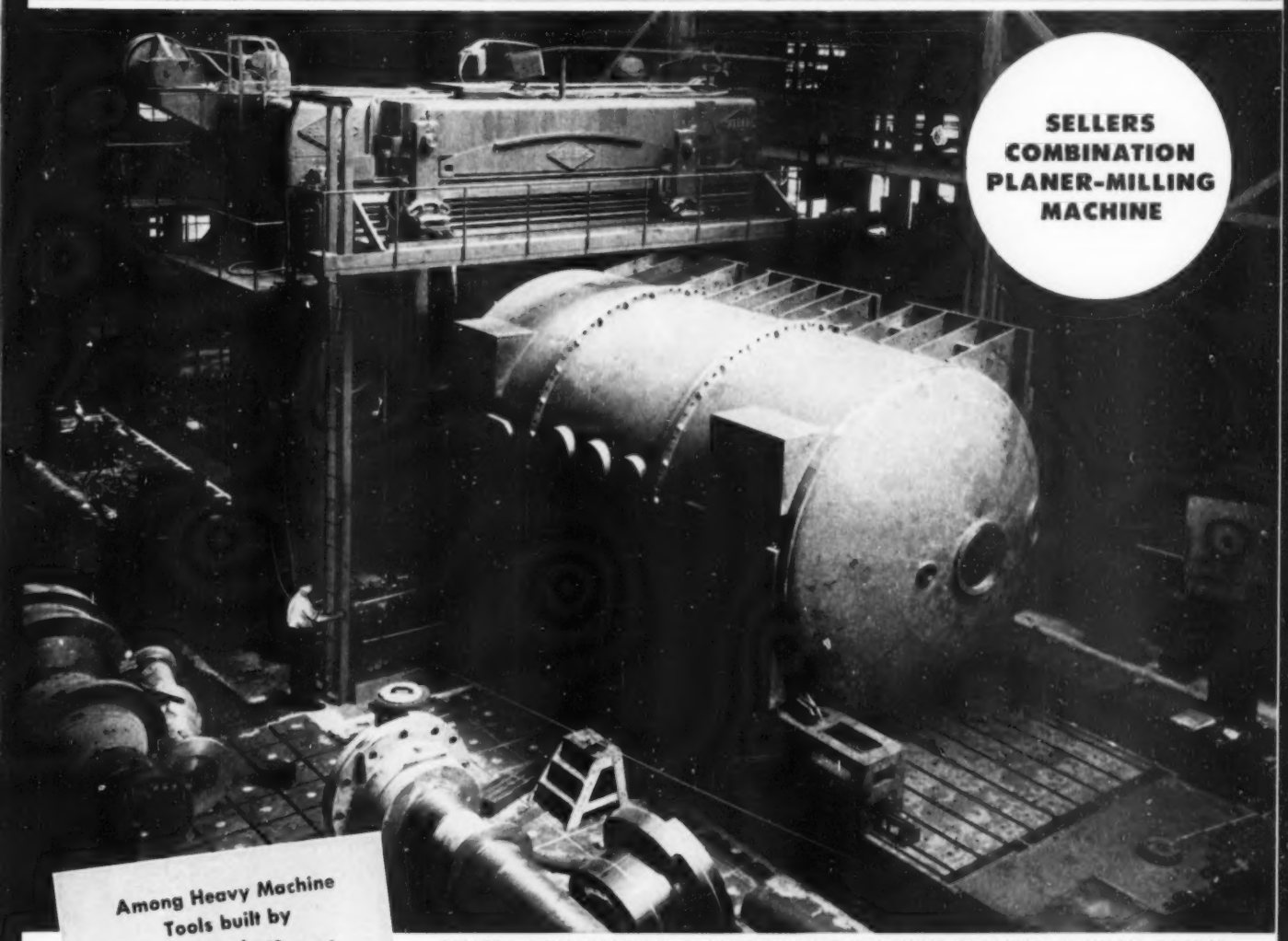
If you produce flat surfaces, your best bet is Blanchard Grinders—with Blanchard Wheels!

PUT IT ON THE BLANCHARD

Send for your free copies of "Work Done on the Blanchard", fourth edition, and "Art of Blanchard Surface Grinding".

THE BLANCHARD MACHINE CO.
64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.

ANOTHER GIANT CONSOLIDATED SPECIAL MACHINE FOR UNUSUALLY LARGE WORK



SELLERS COMBINATION PLANER-MILLING MACHINE PLANING A HUGH CASING

Among Heavy Machine Tools built by Consolidated are . . . .

- LATHES
- BORING MILLS
- DRILL PRESSES
- MILLING MACHINES
- BORING MACHINES
- COLD SAW MACHINES
- BORING, DRILLING AND MILLING MACHINES
- DRILL AND TOOL GRINDERS
- PLANERS
- SLOTTERS
- RAILROAD SHOP TOOLS
- AUTOMOTIVE TOOLS
- AND OTHER SPECIAL MACHINES

The Sellers Combination Planer-Milling Machine is used in the production of equipment for industrial and power generating applications such as, synchronous condensors, hydraulic turbine-driven generators and large motors and generators for steel mills and similar installations. Two machines in one . . . a planer and a miller . . . it eliminates the necessity of transfering work from one machine to another when both planing and milling operations are required. This huge machine is over 76 feet long, 27 feet high and weighs more than 645,000 pounds. It has the capacity to machine work 14 feet wide, 16 feet high and 30 feet long. Due to the enormous capacity of the machine, several parts to be machined may be bolted together and handled as a single unit.

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

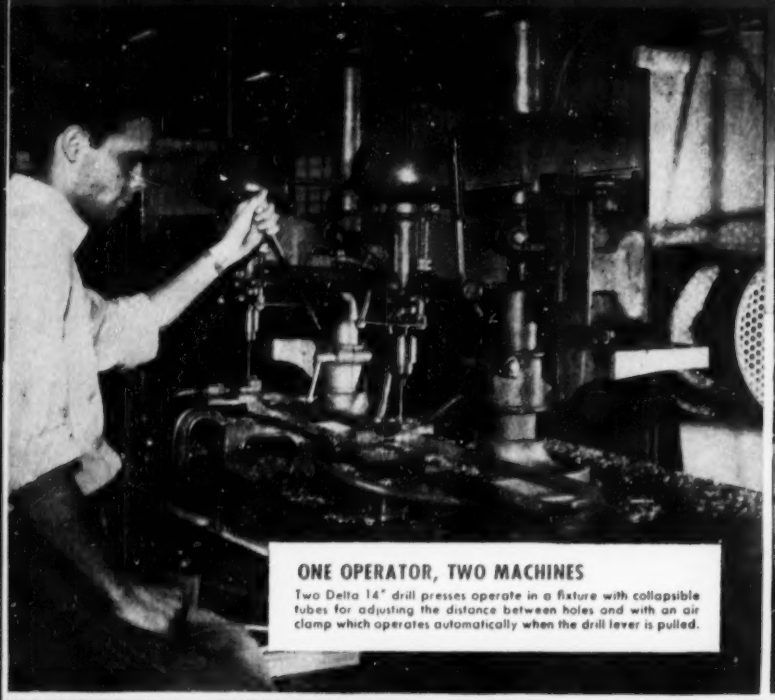
BETTS • BETTS-BRIDGEFORD • COLBURN • HILLES & JONES • MODERN • NEWTON • SELLERS

CONSOLIDATED
MACHINE TOOL CORPORATION

SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED

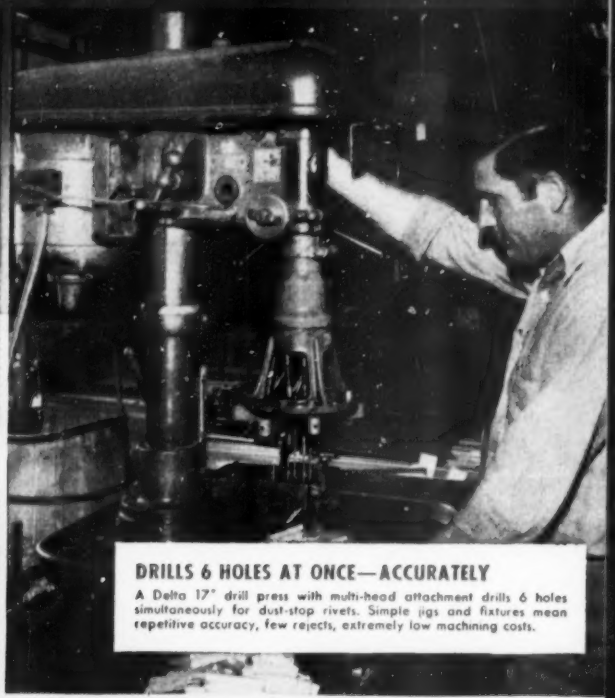
ROCHESTER, NEW YORK

USING 21 DELTA DRILL



ONE OPERATOR, TWO MACHINES

Two Delta 14" drill presses operate in a fixture with collapsible tubes for adjusting the distance between holes and with an air clamp which operates automatically when the drill lever is pulled.

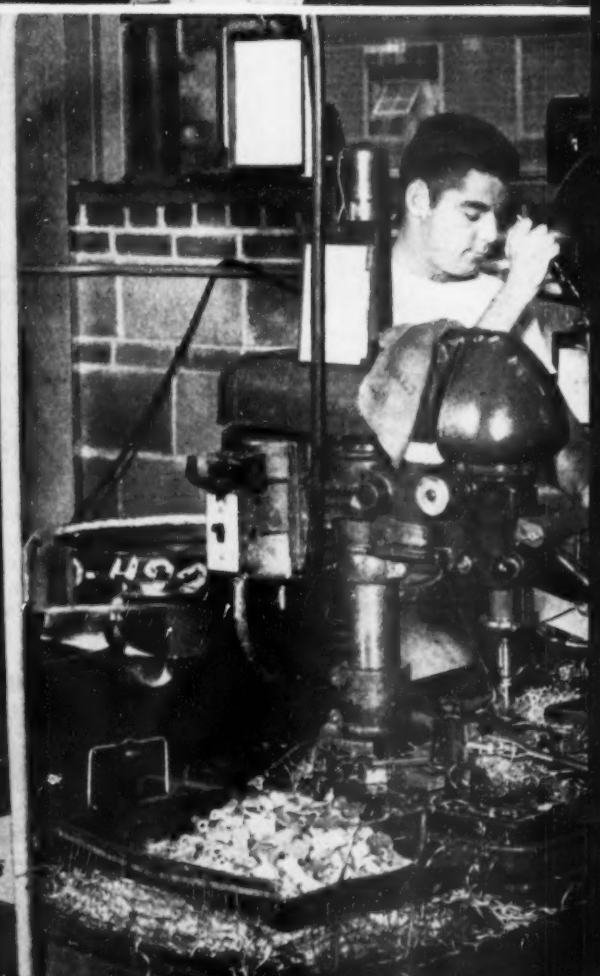


DRILLS 6 HOLES AT ONCE—ACCURATELY

A Delta 17" drill press with multi-head attachment drills 6 holes simultaneously for dust-stop rivets. Simple jigs and fixtures mean repetitive accuracy, few rejects, extremely low machining costs.

ACCURACY AT HIGH SPEED

A unit of six Delta 14" drill presses is used for high-speed drilling. Materials handling costs are cut to the bone.



PRESSES, CUPPLES PRODUCTS CORP.

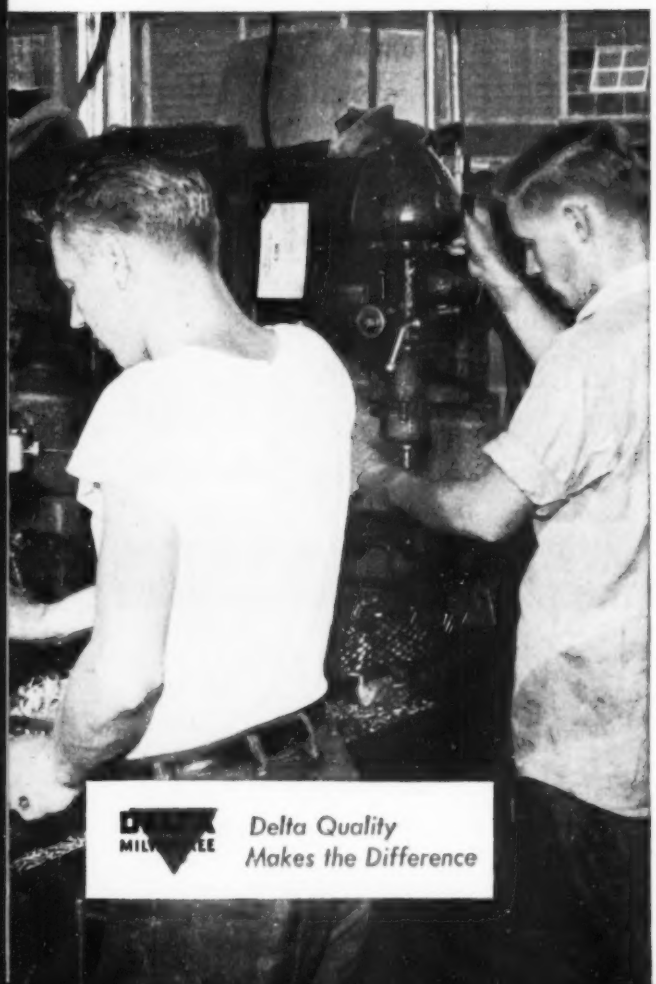
ELIMINATES SET-UP CHANGES...

MAINTAINS INCENTIVE DIRECT LABOR EFFICIENCY...

SPEEDS PRODUCTION!

Plus ***gaining these added benefits that increase work flow:***

- **Less Materials Handling**
- **Greater Flexibility— Move the Tools to the Job, or the Jobs to the Tools**
- **Easier Operating Training**
- **Direct Savings in Labor Costs**
- **Negligible Maintenance**



For less than the cost of one major machine tool, Cupples Products Corp. bought 21 Delta drill presses, spotted them at key points in their production line and got the results listed above.

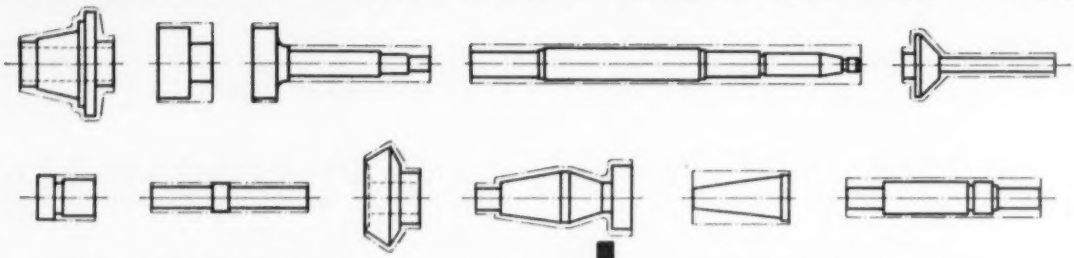
Isn't it "good business" to examine your own shop procedure and see if the Cupples plan won't work for you? It has in hundreds of plants. Ask your dealer about Delta tools—sturdy, light, accurate, versatile, mobile and best of all, very inexpensive.

Your Delta dealer is listed in the yellow pages of your phone book under "Tools" or "Machinery." If you'd like catalog AB52, which describes the complete Delta line, ask him for a copy—or write to: Delta Power Tool Division, Rockwell Manufacturing Co., 618D North Lexington Ave., Pittsburgh 8, Pa.

DELTA QUALITY POWER TOOLS

Another Product by **Rockwell**

IF YOU HAVE TO PRODUCE PIECES SUCH AS THESE



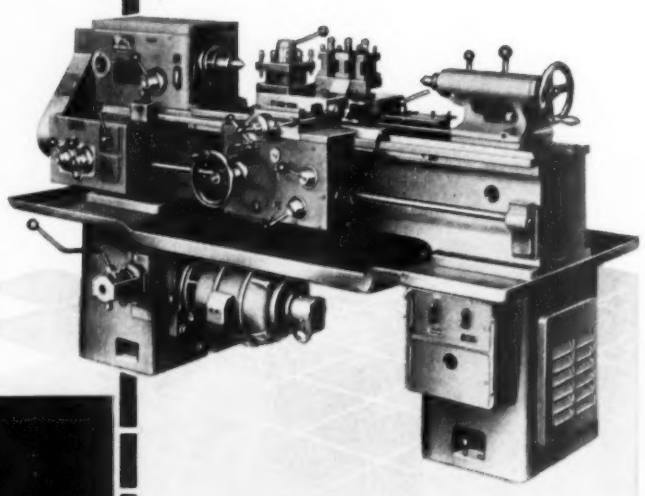
THE PZ 165 IS THE PRODUCTION LATHE *FOR YOU!*

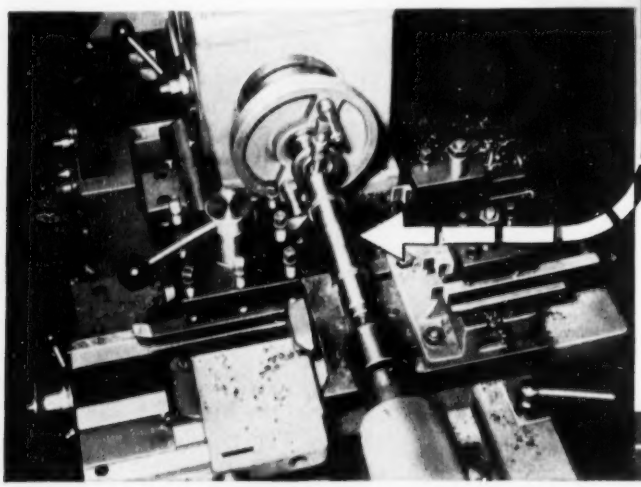
Regardless of whether it is 10 or 50 or 250 pieces, the PZ 165 production lathe is the machine for the job!

The PZ 165 is especially suited for center turning, as for example, rough- and finish-turning of shafts down to gauge size

Quick Change! The greatest feature of this lathe is the ease and rapidity with which it can be set-up for each new job.

Everything about this lathe is designed to help you attain quantity production! Speeds of 120/1500 and 190/2400 RPM – electric brake for stopping the spindle lightning fast – automatic disengagement of the longitudinal and cross feed to .0004" – 5 HP electric motor.





WEISSER HEILBRONN

DATA:		
	Height of centers	6½"
	Swing over bedways	13¹⁄₁₆"
	Swing over cross slide	6½"
	Distance between centers	20"/40"

WEISSER HEILBRONN

Always Best! Always Weisser!

Representatives and Service:

USA: Guthery Machine Tool Corp., 130 West 42nd Street, New York 36, N. Y. Telephone CHickering 4-2820.

Canada: Transocean Machine Company Inc., 1170 Drummond Street, Montreal P.Q. Telephone: UNiversity 6-3304.

EUGEN WEISSER & CO. KG.

HEILBRONN / NECKAR (Germany)

Machine Tool Manufacturer - Salz Strasse 79/83 and 128/130

Among the many contractors who make these 50 caliber, 60 caliber and 20 m/m brass and steel cartridge cases, a few use machines that are strictly special—designs that will be practically scrap value, so far as adaptability to other work is concerned, when the shell job is finished.

Many more millions of these shell cases are now being machined on

Standard 6 Spindle ACME-GRIDLEY Bar Automatics

Some of these standard machines are equipped with magazines loaded by hand, as on the job illustrated, others with fully automatic hopper feeds—reducing man hours to minimum.

And with simple carbide tools output is fast—in fact 1.5 seconds (2,400 per hour).

* * *

WHAT'S THE PAYOFF? Just this—when the job is done, Acme-Gridleys can quickly be retooled—good for years more service on peace-time parts production. Quite a difference in investment value and long terms profit.

Whatever your specific bar automatic needs today, consider also the value of these machines tomorrow—the importance of Acme-Gridley basic universal application and modern tooling ingenuity.

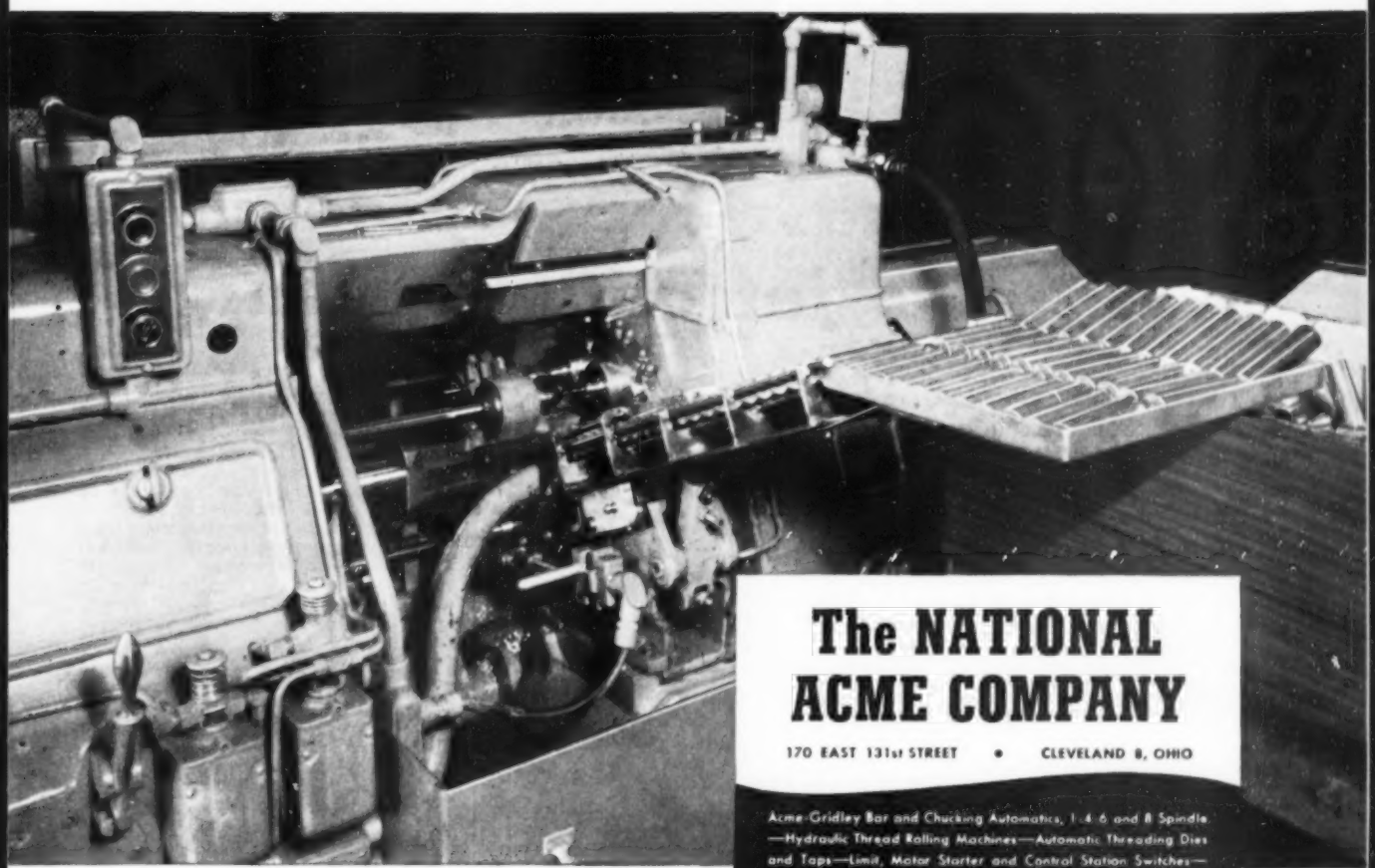
We've built more than 45,000 of them—in sizes up to 7¾" capacity.

here today...

BUT

what about tomorrow?

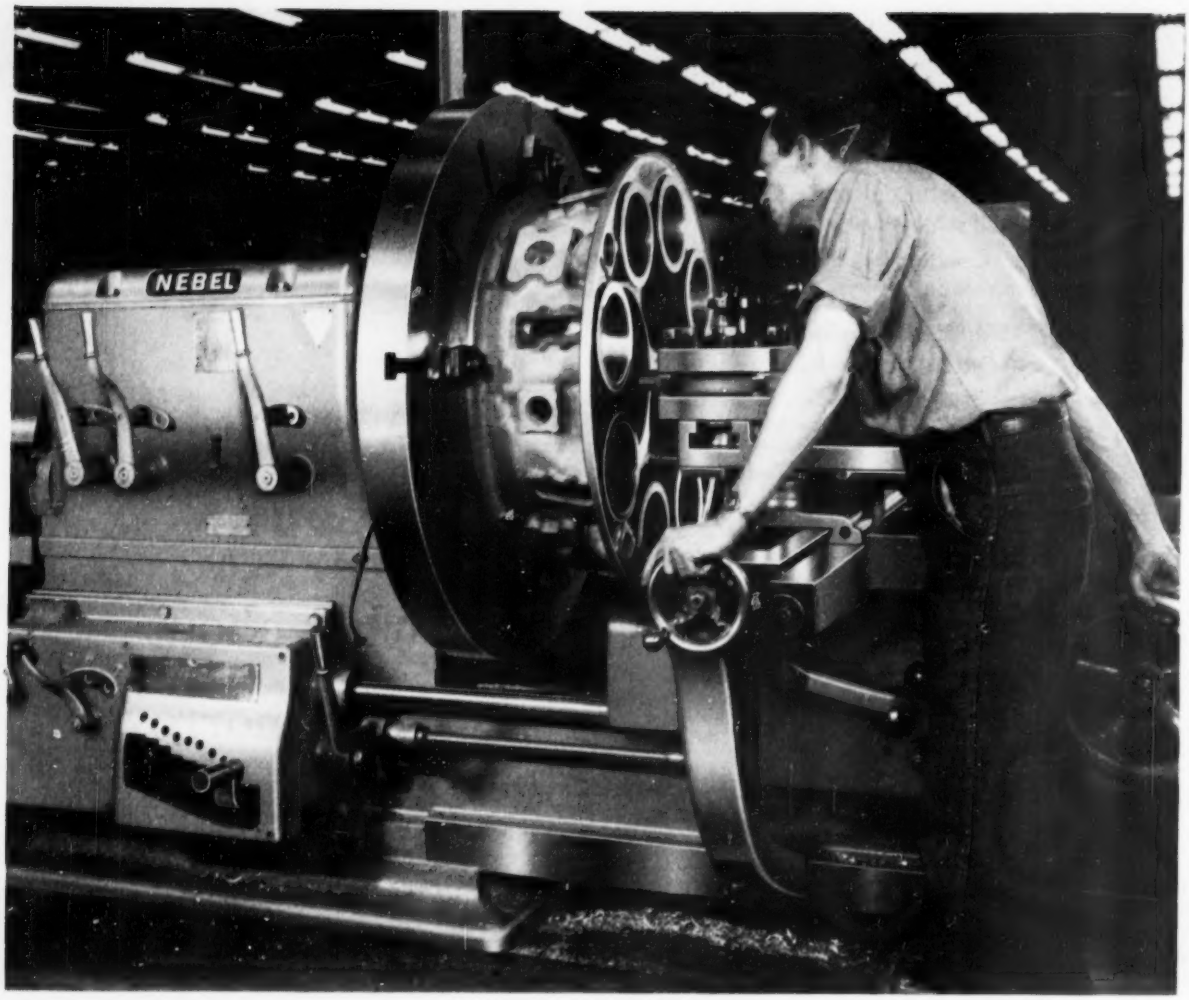
You can't do TODAY'S *job... with* YESTERDAY'S *tools... and be in business* TOMORROW



The NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics, 1, 4, 6 and 8 Spindle —Hydraulic Thread Rolling Machines—Automatic Threading Dies and Taps—Limit, Motor Starter and Control Station Switches—Solenoids—Contract Manufacturing.



Speed and Accuracy count at G.E.'s jet engine plant

TOUGH JOBS ARE EASY WORK for Nebel extension bed gap lathes . . . with their flexible swing and center distance capacity. The Nebel "G" series shown above—machining a hard-to-handle compressor rear frame—is one of several on the job at General Electric's jet engine plant in Cincinnati.

MORE LATHE... LESS MONEY. Nebel lathes give you the speed, power, stamina and accuracy you need at minimum cost. They're ideal for production and maintenance requirements. Available in heavy duty engine, removable block gap and extension bed gap models . . . in swing sizes from 16" to 50".

basic... economical... dependable

Write today for descriptive literature. The Nebel Machine Tool Co., Cincinnati 25, Ohio, U.S.A. Members of the National Machine Tool Builders' Association.

Nebel

the workhorse of the metalworking shop since 1899

BAND MACHINES
BAND TOOLS
DoALL
GAGE BLOCKS
SURFACE GRINDERS

PRODUCTION NEWS

SAW BANDS • GAGING EQUIPMENT • TOOL STEEL • CUTTING TOOLS • INDUSTRIAL SUPPLIES

Vol. 2 Published by The DoALL Company, 254 N. Laurel Ave., Des Plaines, Illinois No. 2

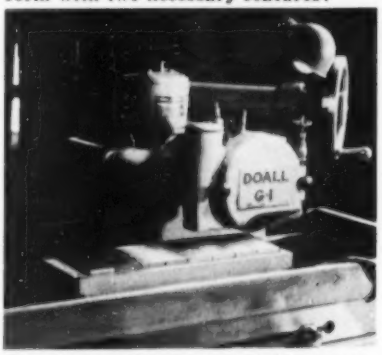
Carbide Tool Output Upped "Remarkably" by Change to DoALL Surface Grinder

7 Times More Pieces Before Each Wheel Dressing; Work Now Done in One Pass — Formerly Took Two

That there are radically varying standards of performance among surface grinders and that replacement of inefficient or obsolete models is a profitable investment, is amply evidenced by the report of Radform Tool Company, East McKeesport, Pa. The accompanying table compares performance of their DoALL Grinder with the machine it replaced for diamond wheel grinding of carbide inserts used in milling cutters.

Although the Radform Company classed the DoALL performance as "remarkable", an analysis of the reasons for the improvement show that it could have been anticipated.

The DoALL Grinder provided Radform with two necessary features:



View of the full chuck load of 64 pieces on DoALL Grinder at Radform Tool.

1. *Rigidity*—enabling the grinder to take heavy cuts with extreme accuracy across the *entire* work area. This permits the entire chuck area to be utilized for the work. An additional benefit of rigidity was elimination of wheel "bounce", which, particularly in the case of a diamond wheel, causes rapid breakdown and frequent need for dressing.

2. *A More Powerful Chuck*—capable of holding the pieces without blocking which takes up space otherwise usable for the work load.

Close-up showing serrations on bottom of work pieces which reduce surface area available for magnetic attraction. Only a powerful chuck could hold these pieces without any blocking around them.

The rigidity of a DoALL Grinder stems from no single feature, but is a composite result of the entire design. And, it is this rigidity, the ability to hold "hair-splitting" tolerances on the work piece with the grinder controls, that is the primary function of a surface grinder.

Some of the design elements which contribute to DoALL rigidity are an extra long column, a husky spindle, a heavily ribbed frame, a uniform oil film delivered to the table and saddle ways under meter control. This ever-present oil pressure maintains clearance and prevents loss of table-to-wheel dimensional accuracy even under the pressure of heavy cuts.

Other data on DoALL Grinder design and performance are covered in a new 20-page catalog available upon request.

Performance Table — DoALL Grinder, Radform Tool Company

	DoALL Grinder	Previous Grinder
No. of pieces per chuck load	64	20
Blocking needed to hold work on chuck?	No	Yes
No. of pieces per wheel dressing	512	40
No. of passes to take .018" cut	1	2

—See Next Page—→

New Literature Provides Useful Data

New techniques, new applications, new products and accessories are described in the Catalogs and Bulletins listed below. Copies are available free upon request, without obligation.

DoALL Precision Hydraulic Surface Grinders—20 pages. How new DoALL Grinders can be applied to a wide variety of surface, cylindrical and form grinding jobs is explained and pictured. Attachments for fully automatic grinding, skip feeding, automatic cross feed reverse, crush dressing and other operations are described. Patented "Cool-Grinding" (coolant *through* the wheel) is shown as a means to heavier cuts, better finishes and faster output. Specifications and design features of the new models are included.

Modern Measurement Control—16 pages. The need for millionths inch accuracy in dimensional gaging is explained and pictured under the heading "The Evolution of the Inch" in this new gage block catalog. Illustrations of 12 steps in their manufacture tell "why you can trust DoALL Blocks". DoALL Block Sets, from 5-piece to 118-piece, are illustrated and listed. Other gaging equipment and accessories are shown.

Because gage blocks should be periodically checked for accuracy and condition, DoALL Laboratory Calibration Service for users of any make of blocks is described.

DoALL Micro-Step Gaging System—4 pages. The means for putting gage blocks to work in the shop and toolroom as well as the inspection department are explained in this new bulletin. Illustrations show methods for assembling thousands of different gages with standard rectangular gage blocks, new DoALL block Holders and End-Standards which provide uninterrupted measuring surfaces at each end of an assembled gage.

Did You Know . . .

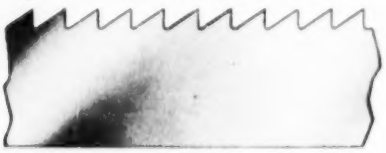
. . . that you can see any DoALL product *before* you buy it? That all 38 local DoALL Sales-Service Stores are equipped to give free demonstrations of any DoALL machine in your plant, on your work if you ask them to?

Users Reports Show Importance of Saw Band Selection

Blade Type, Pitch, Width, Set Pattern Greatly Influence Performance of Any Contour or Cut-off Band Saw

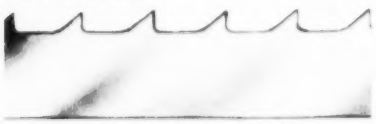
Often the efficiency of continuous sawing with a contour band machine or horizontal cut-off band saw is seriously impaired by incorrect selection of a saw band for the job. Recent reports from DoALL saw band users strongly emphasize this point. Here are typical reports:

1. *Cut-off time reduced from 1⅓ hours to 1⅓ minutes!*—cutting 4½" O.D. 14-S aluminum bars on a Kalamazoo machine. Using a standard ¾" wide 6-pitch blade, 1 hour 20 minutes was required to cut one bar. After switching to a ¾", 3-pitch DoALL *Claw Tooth* blade, cut-off time was reduced to 1 minute 20 seconds! This job required a different pitch and type of blade than that originally used.



Precision

2. *Blade life increased 20 times!*—miscellaneous cut-off work formerly consumed 3 or 4 blades daily. A change to the new DoALL positive rake *Claw Tooth* was recommended by the DoALL Saw Specialist. Result: the new blades last over a week.



Buttress

3. *Cut armor plate twice as fast*—use of an 18-pitch saw band required five minutes cut-off time on tough armor plate. Use of a *6-pitch* DoALL blade reduced cut-off time to 2 minutes.

4. *Eliminates trouble, saves time*—a change-over from a ¾" width 12-pitch *raker set* blade to DoALL ⅝" wide 8-pitch *wave set* blade eliminated trouble for a Wells saw user, reduced cut-off time 25 minutes per piece on 8¼" steel. Here, width, pitch and set pattern all contributed to the improved performance.

Claw-Tooth

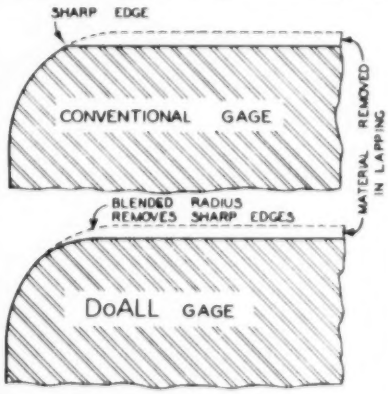
5. *Improves performance*—change from a standard 8-pitch blade to a 6-pitch DoALL *Buttress* blade improved performance for a Kalamazoo customer to the extent he has standardized on the DoALL band.

When DoALL Saw Specialists recommend changes in the types of saw bands being used by customers, the results bear out the recommendation. DoALL's sawing practice know-how is available to band saw users who request the services of a DoALL Specialist.

Cut-off

DoALL Gage Blocks "Burr-Proofed" for Accuracy, Long Life

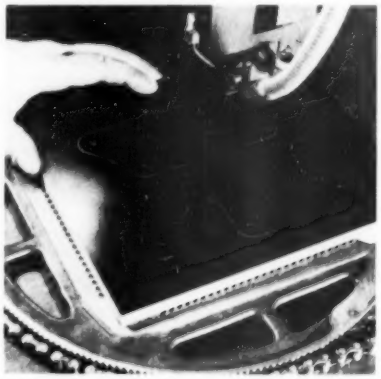
Sharp edges on a gage block will become burred in normal usage. Even a two-millionths inch burr can make a block unsuitable for use. To prevent such burrs it is standard practice in manufacturing gage blocks to round the edges before final lapping. However, the final lap creates new sharp edges. Rounding the edges after final lapping has generally been avoided by the industry because of danger of damaging the accuracy of the blocks.



To meet this problem DoALL has developed an exclusive process for re-rounding the edges after a final lapping without distorting or damaging the block. As a result, DoALL Blocks have rounded, burr-proofed edges. They are guaranteed to equal or exceed National Bureau of Standards requirements for dimension, flatness and finish. DoALL manufactures all blocks in air conditioned laboratories under exacting control and inspection procedures.

Special Sizes, Tolerances DoALL Ground Flat Stock Save Time and Money

DoALL Precision Ground Flat Stock (oil hardening tool steel) is now available on special order accurate to plus or minus .0005" to meet aircraft and other industry specifications. Standard accuracies are plus or minus .001".



In addition to 251 standard sizes carried in stock, DoALL can also provide a wide variety of special sizes including lengths up to 120" and widths up to 20".

Selection of the size of Ground Flat Stock to best meet a given requirement results in substantial time and material savings. A bulletin describing DoALL Flat Stock and a wall chart of sizes are available upon request.

DoALL Packaged Service Cuts Downtime and Repair Costs

A new approach to machine repair and maintenance has been introduced with the DoALL Package Service Program, which emphasizes preventive maintenance rather than costly last minute repairs. A unit price for each "package" includes parts and installation.

Repairs are made by factory-trained technicians using genuine DoALL parts. Rather than replacing a single part, mating parts or complete assemblies are replaced. Such replacements can be made during a single service call more economically and with less downtime than if the parts were replaced, one by one, over a longer period. Machine performance and productivity are kept at maximum efficiency.

Forty-one DoALL Saw and Grinder assemblies are covered by the new service program, including: welders, air pumps, table bearings, table cylinders, grinder spindles, Selectron, transmissions and others. There are also several basic overhaul packages.

Did You Know...

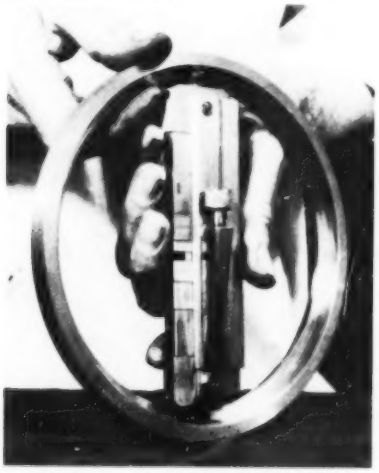
...that new DoALL Precision Surface Grinders can take heavier cuts with greater accuracy, and without burning the work, than is possible with any other surface grinder?

Gages of Any Length Now Made with Gage Blocks

New DoALL Micro-Step Gaging System Simplifies Checking of Parts, Other Gages and Machine Tool Set-ups

Gages up to six feet or more in length, accurate to millionths of an inch, can now be made up quickly and easily with standard rectangular (USA type) gage blocks.

The unique design of the DoALL Micro-Step Gaging System makes possible assembly of internal gages, indicating gages, pin gages, snap gages, depth gages, scribers and many other instruments. With this System, direct use of gage blocks can now be made for checking of parts, gages, instruments and machine tool setups. The cost of many special gages can be eliminated and rejects can be reduced through more accurate dimensional control.



Internal gage, using ball end standards

Two components of the Micro-Step System make such gages possible and practical for use in the inspection department, toolroom and shop:

1. *New Gage Block Holders.* Adjustable channel type holders are available in standard lengths up to 72" for making a wide variety of gages. Longer lengths are also available. A unique caliper holder is ideal for making outside and inside calipers, dividers, scribing compasses and other instruments up to 6" dimensions.

2. *Fully Exposed End Standards.* These are specially designed gage blocks which are inserted at each end of the holder to provide the actual measuring surfaces of the assembled gage. Their unobstructed surfaces extend beyond the ends of the holder, permitting many setups never before possible with gage blocks and holders. Ball ends, foot blocks, center points, scribers and many other end standards are available such as the dial indicators to assemble indicating gages.

DoALL Caliper Holder for gage blocks and end standards

6-foot indicating gage made by assembling gage blocks in holder.

The expendability of gage blocks is considerably reduced as there is less wear, although their use is greatly increased. The gages are wrung together by the *moderate pressures* of the holder clamps so that there is no distortion due to squeezing. The wear caused by rubbing action when gage blocks are wrung manually is entirely eliminated. Assembly in the holders minimizes the chance of dropping the blocks or otherwise damaging the measuring surfaces. The blocks do not contact the work being checked, the End-Standards take over this function.

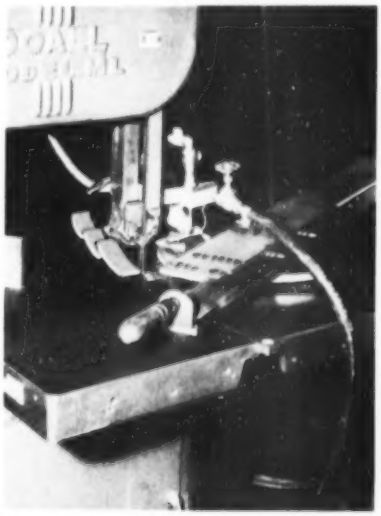
A complete explanation of the components of the new Micro-Step System and how they are assembled is contained in a new bulletin available upon request.

Production Tripled, Material Saved with DoALL Contour Machines

The Helwig Tool Company, St. Paul, Minn., faced with the problem of producing an aluminum part which could not be blanked to shape found, after trying other methods, that contour sawing on a DoALL Band Machine was the fastest, lowest cost method available.

Blanking failed because the 75 ST aluminum hard alloy chipped and peeled. Until contour sawing was tried, the blanks were sheared and their radii trimmed on a lathe, using a special fixture. This time-consuming method limited production to 200 pieces per hour.

This figure was jumped to 600 pieces with the installation of a DoALL ML Contour machine. Time per piece was cut from nearly 30 to only 6 seconds.



Showing fixturing for cutting shapes on DoALL machine at Helwig Tool Co.

In addition, the neat, slicing process of contour machining saved 33⅓% of expensive aluminum alloy lost in the former shearing and turning process.

This supplier, once behind his schedule, now has a 7 weeks bank of parts waiting use.

Two DoALL Stores, Three Dealers Serve Canada

Complete service and information on DoALL products is readily available to Canadian plants by calling the DoALL Sales-Service Stores in Toronto and Montreal, or the following dealers: T. S. Taylor Machinery Co., Ltd., 187 Bannatyne Avenue, East, Winnipeg, Manitoba; Mechanics Supply Company, 10234 103rd Street, Edmonton, Alberta; Thomas Skinner & Son, Ltd., 14 Powell Street, Vancouver, B.C.

----See Next Page--→

Bulletin Gives Tips On Hack Saw Blade Use

Included in the bulletin "DoALL Hack Saw Blades" are the following tips on how to secure greater sawing efficiency and longer blade life:

Hints On Power Blades

1. Start cutting at a point where the most teeth come in contact with the work.
2. Keep the saw tight—loose blades wear more quickly, don't cut straight.
3. When the blade becomes too dull to cut satisfactorily start the next piece with a new one.
4. A new blade with sharp teeth should not be forced as much as an old one.
5. Be sure coolant is flowing before blade contacts work.

Hints On Hand Blades

1. Point teeth away from handle.
2. Be sure blade is straight and taut (but not so tight it will pull away at pin holes).
3. Material should be held rigidly in a vise.
4. Starting strokes should be easy and slow, at a very slight angle to material. When starting a cut at a corner use a very light stroke until cut is long enough for three teeth to cut at a time.
5. Bear down on the forward stroke enough to make teeth cut. Raise up on return stroke to avoid dragging teeth, dulling blade.

The bulletin also contains a speed and feed chart for power hack saw blades, selection charts, specifications and prices on all types of DoALL power and hand hack saw blades.

DoALL Vernier Blocks Greatly Extend Range of Use of Any USA Gage Block Set

The usefulness and multiplicity of dimensions obtainable from any rectangular gage block set can be greatly extended by adding to it a pair of DoALL Vernier Blocks. These blocks provide means for setting up heights in increments of 10 micro-inches. Nominal height of the set is .700", but one surface of each block is tapered. The height increases as the upper block is moved to the right, decreases as it is moved to the left. The amount of change is indicated by 10-micro-inch graduations on the upper block as shown in the illustration. Price is available upon request.

Showing DoALL Vernier Blocks in use with DoALL Sine Bar

CALL DoALL locally at these Sales-Service Stores

ATLANTA 3, GA.
304 Decatur St., S.E.
Call DoALL: Walnut 5384

BALTIMORE 12, MD.
5621 York Rd.
Call DoALL: Hopkins 5340

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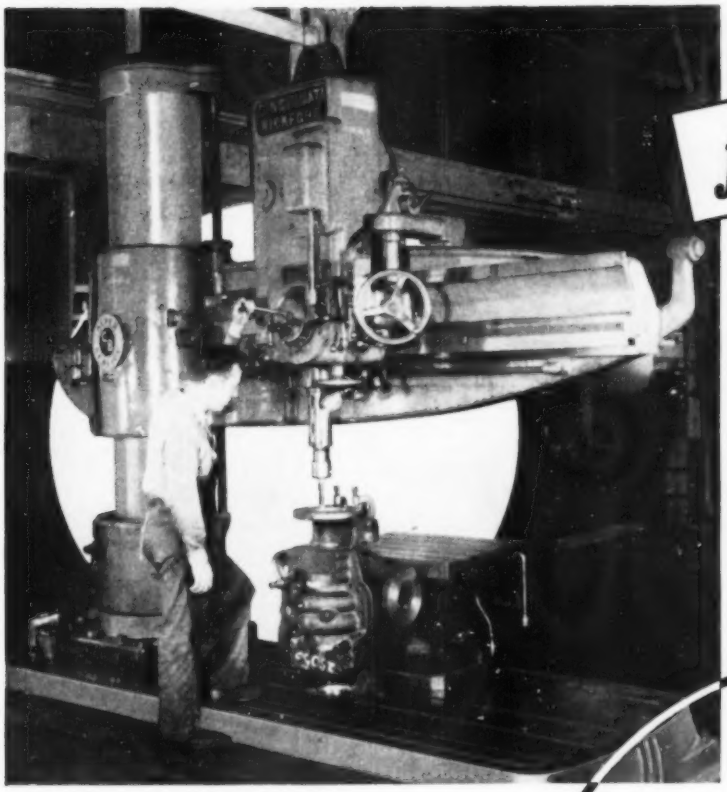
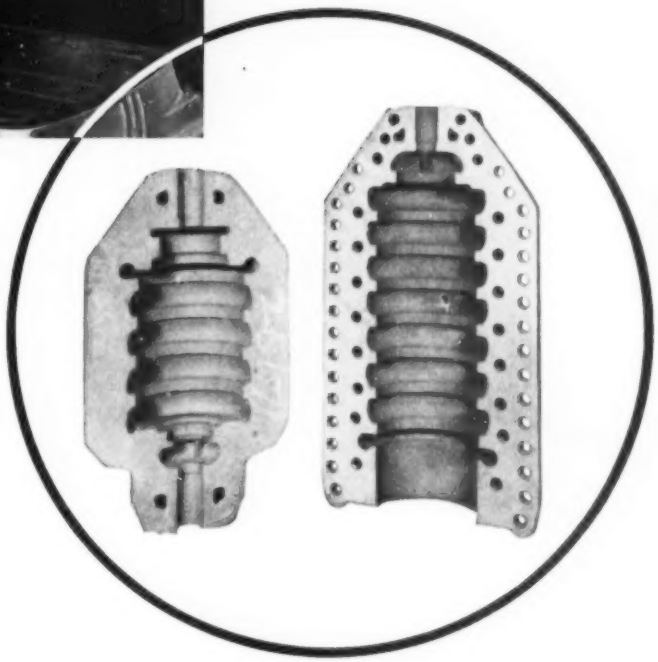


Photo—Courtesy Pacific Pump, Inc.

faster and easier... machine performance

Pacific Pump, Inc., say maximum production is the result of the faster, easier controls and fine balance of our 7′ arm, 19″ column Cincinnati Bickford Super Service Radial Drill. Here centrifugal pumps for process industries, utilities, and marine power plants, are being drilled, tapped, and spotfaced with speed and economy. Cincinnati Bickford Super Service Radial Drills will bring you too, maximum productivity at low cost.

Write for Booklet R-29.



Half shells for a centrifugal pump—approximately 100 holes are drilled—half of which are also tapped.

CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.

No. 14 in a Series of Jones & Lamson Reports to Management

Planning for Peak Performance

STANDARD PRESSED STEEL'S MODERNIZATION PROGRAM:

Outraces the Calendar, Inflation with Bold new Concept of Machine Surplus

PROGRAM: Top producer of socket screw products and precision aircraft parts used long-range projection of trends as a guide to increased productivity and reduced costs . . . re-invested 80% of net profits in the past ten years in modernization of plant and equipment.

RESULTS: "Productivity per payroll hour more than doubled since 1946 . . . average sales prices up only 15%, as against 85% for all metal products in 10 years . . . book value of fixed assets doubled in 5 years . . . top wages . . . profits adequate to continue replacement under a 'power surplus' policy . . . now planning ahead to 1960."

THE STORY: Key to the sensational record of SPS's long-range expansion program is a dynamic philosophy, unique policy, and some simple but surprising arithmetic.

The Philosophy

"Increasing productivity requires greater and greater amounts of capital and less and less human energy," says H. Thomas Hallowell, Jr., President of SPS. "For, as it has been so aptly stated — no war, strike or depression can so completely destroy an established business or its profits as new and better methods, equipment and materials in the hands of an enlightened competitor."

SPS formula for leadership: one of the most modern plants in America — and a complete blueprint of that plant's operation and equipment five years from now.

The Policy

There are 3 main planks in the Hallowell platform:

1. *Pre-planning* and computation of plant, equipment and environment necessary to "make things better in industry for employees, customers and stockholders through achievement of the maximum physical output per payroll worker." To this end, Hallowell himself spends half his time with today's problems, the other half on advance planning.

2. A bold attitude toward capital investment necessary to bring about tomorrow's quality, prices, wages and profits today. Since 1946 this investment has exceeded $10,000,000 — a cool 80% of net profits. Machine tools *which are still only in the development stage* are already on order by Standard Pressed Steel. Thus, in spite of the fact that the average age of SPS's machines is under 5 years!

3. "Quality control depends on the tools. We don't make parts to inspect them . . . thirty men worked a year and a half on the problem of developing a new process to inspection-free standards: cost — $250,000; savings — many times that."

The Arithmetic

There are 10 machines for every 8 operators at SPS. Reason: "The interest on a $10,000 machine is $12 a week — an operator's pay for 3 hours. It's cheaper to shift a man between machines than to shift a machine from one job to another, paying for down-time on *both* man and machine."

This means a *surplus* of machine power. Result is flexibility and adequate production facilities when business hits the peaks. "We don't keep books to measure lost profits due to inadequate facilities — to find out how much we *might* have made."

And this on the importance of adequate equipment: "I consider the purchase of a single $7,000 machine equal in importance to $1,000,000 in sales. How it figures: Profit on a million-dollar order is roughly $100,000. Taxes take $72,000. Half the remaining $28,000 is net profit after dividends, or a net worth increase of $14,000. With the fixed assets figured at 50% of the net worth, it becomes apparent that the same amount of thought and effort should be put against the purchase of a $7,000 machine as goes into developing a million dollars in sales."

SPS plant, products, prices and profits are solid proof that the arithmetic works!

Jones & Lamson is regularly working with top management in advance planning involving higher productivity made possible by greater automaticity, speed and precision.

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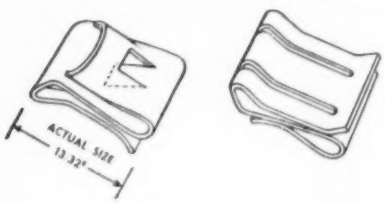
Produce Formed Stampings without Secondary Handlings with U. S. MULTI-SLIDES®



The sequence of operations for the part illustrated is as follows:

1. Pierce, shear and emboss in die head.
2. Cut-off blank from strip, using cut-off slide.
3. Preform around movable and stationary form posts.
4. Finish form around stationary form post, with movable form post withdrawn.

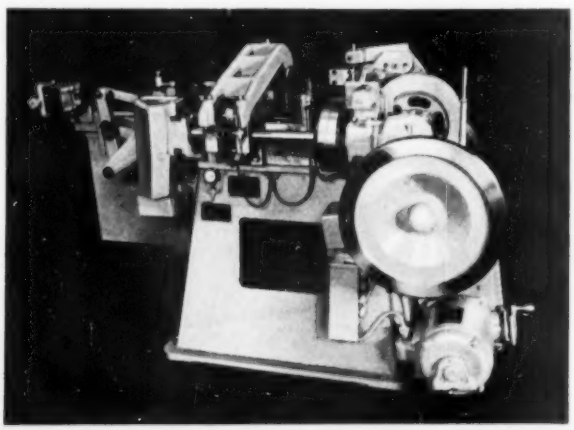
Note that the left hand form tool is withdrawn, and secondary movements are obtained on the rear and right hand form tools by the use of two-lobe cams.

The small electrical part shown in the drawing above is produced from .018" x 5/16" copper in coils at the rate of 125 pieces per minute in a No. 28 U. S. Multi-Slide® similar to the machine shown in the photograph below.

Material of the exact width required is fed into the machine, thus eliminating trimming on the edges. No pilots are used in the dies, because of the accuracy of the feed unit. The feed pulls the material through a flat stock straightener and then pushes it into the dies the exact pitch required. A positive stop prevents any backward slippage of material.

The U. S. Multi-Slide produces parts of uniform accuracy, which naturally reduces spoilage and also results in saving time and labor where the parts are to be assembled in a larger unit. In the die head of the machine such operations as trimming, piercing, shearing, embossing or swaging may be performed; forming being handled by means of tools mounted on the forming slides.

Bulletin No. 15-A contains complete specifications for U. S. Multi-Slide Machines. May we send you a copy?



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of operations performed on

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1. STRADDLE MILLS inside and outside of 4 pads
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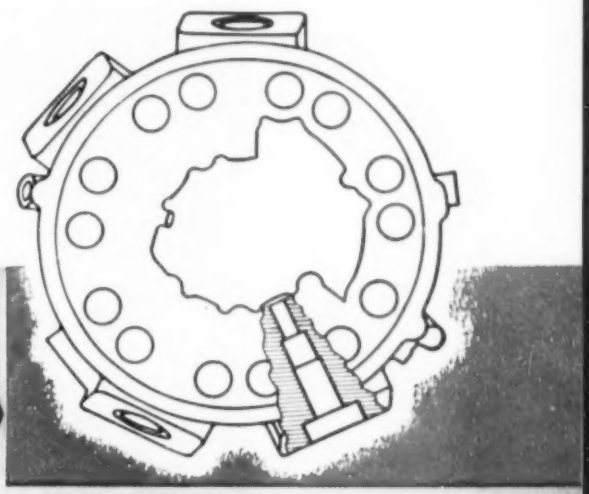
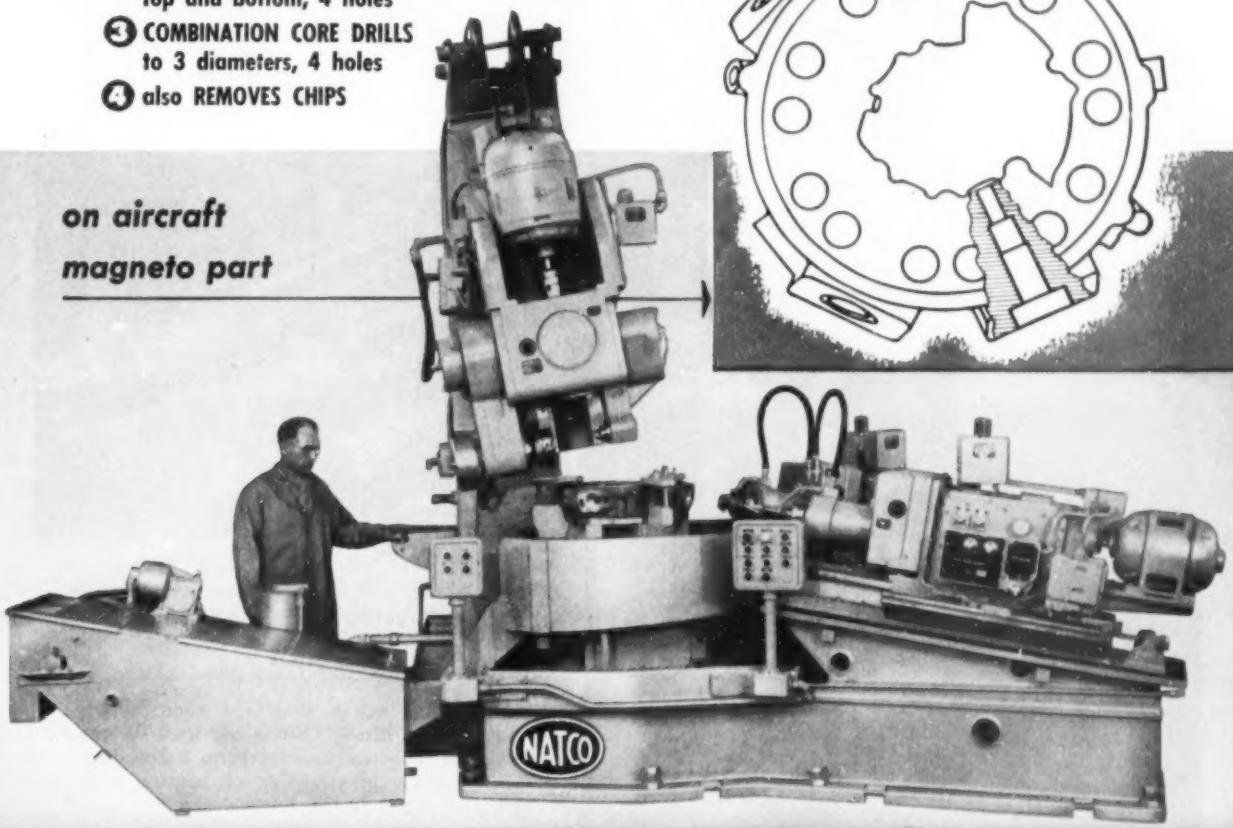
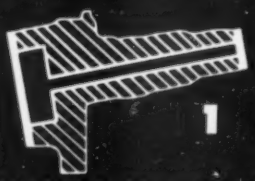
3. COMBINATION CORE DRILLS to 3 diameters, 4 holes
4. also REMOVES CHIPS

on aircraft magneto part



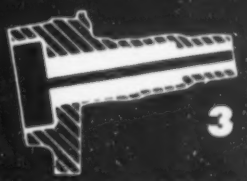


OPERATIONS IN DETAIL



Straddle Mills inside and outside of 4 pads

Combination Counterbores and Chamfers top and bottom, 4 holes



Combination Core Drills to 3 diameters, 4 holes

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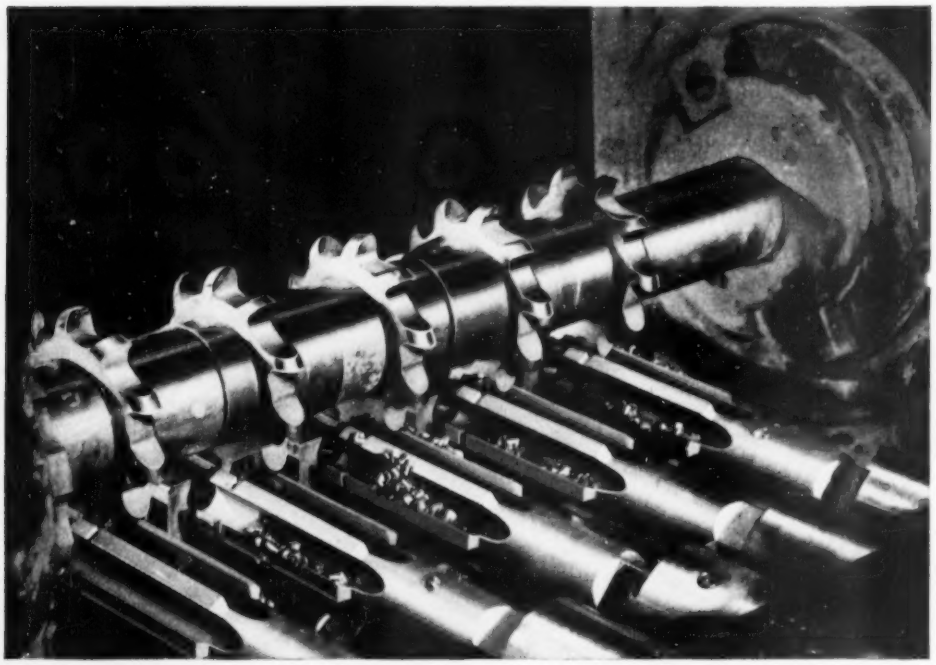
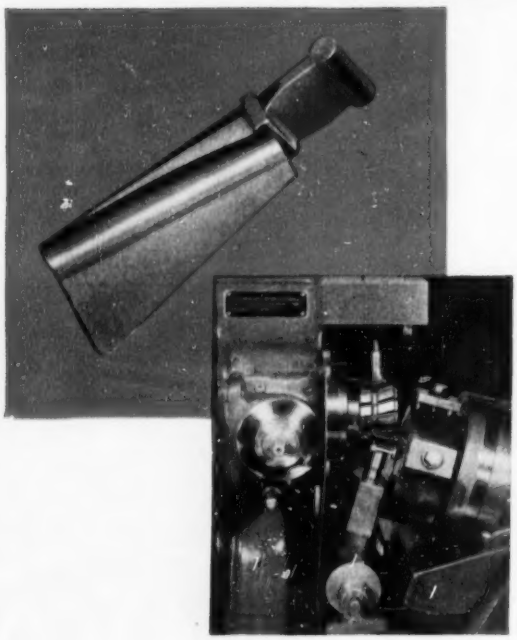
CUT FORM MILLING COSTS WITH





GET PEAK MILLING EFFICIENCY WITH SPECIAL FORM AND ACCURACY

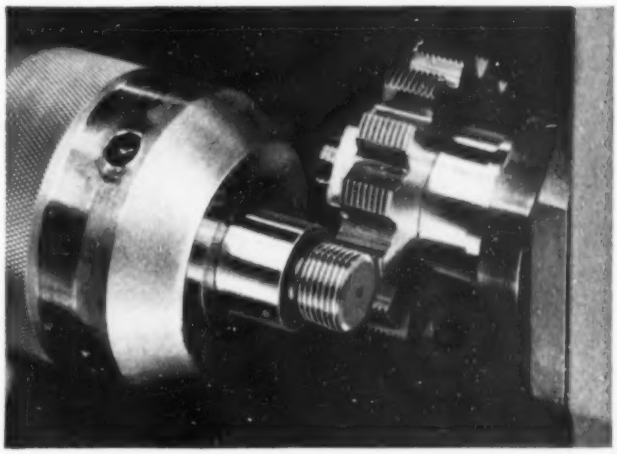
Special milling problems become simplified when Barber-Colman Form-Relieved Milling Cutters are used on the job. Specialists in cutting-form development, Barber-Colman Cutter Engineers combine critical job features with maximum cutting efficiency in the cutter design.

Using special equipment and skills, forms are accurately developed and reproduced on cutter teeth to assure consistent duplication and accuracy in successive cuts. Cutters are projected 50 to 100 times size against engineering layouts to check exact tolerances. Accuracy of form is maintained the full length of the teeth and indexing of teeth is held to close tolerance, allowing the cutters to be sharpened accurately on automatic sharpening machines.

Many times, a series of cuts can be combined into a single combination-form cutter. As an example, several surfaces on these turbine blades are cut with a single cutter. The special cutter form controls accuracy, finish, and form automatically, making the job easier for the operator and reducing the cost per piece.

DESIGNERS OF STANDARD AND SPECIAL

Barber-Colman FORMED CUTTERS

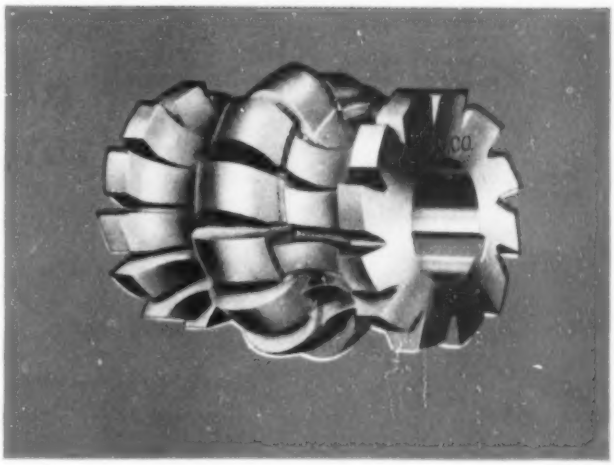


ACCURATE UNGROUND CUTTERS

New standards of production accuracy are available with unground form-relieved cutters because of special engineering techniques and heat treating methods. A change in tool design on this class 3 thread milling job, has cut tool costs and improved the set-up. Barber-Colman engineers designed unground shell type cutters with larger diameter and greater number of teeth to replace ground shank type cutters previously in use. The new design provides class 3 accuracy on ¾"-16 threads and improves the cutting action with a rigid, short-coupled drive.

These Barber-Colman ganged formed cutters hold exact form limits on contour of 3 lobe supercharger rotors, maintaining high production and tool life. Form on each lobe is held within .003" at a radius of 1.160". Production is 30 minutes floor-to-floor per rotor, 50 rotors per sharpening.

These typical jobs are evidence that special form-relieved cutters can aid you on many of your complicated milling problems. Cutter efficiency of this type is possible with tools engineered-for-the-job. Try Barber-Colman form-relieved cutters on your next production milling problem and experience the satisfaction of having fewer operations, simplified tooling, faster production and trouble-free machining. Send us blue-prints and sample parts for analysis and quotation.



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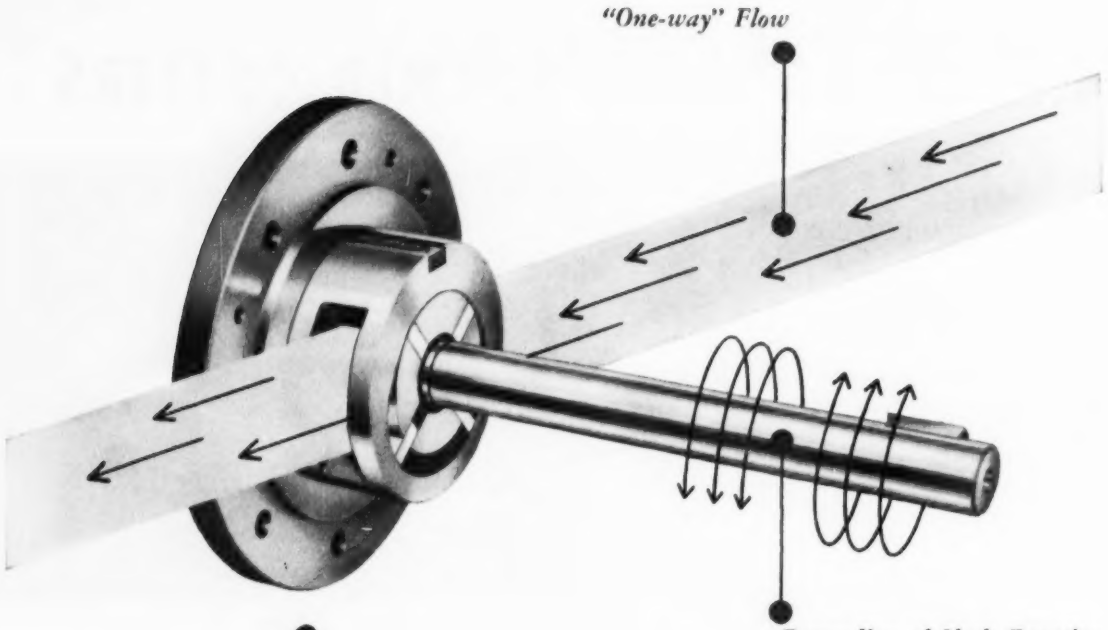

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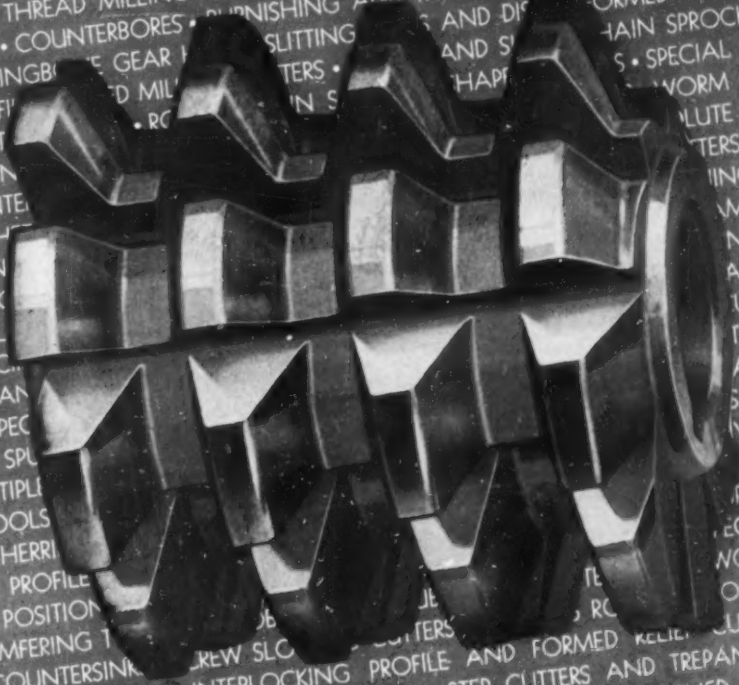

● **Years of successful experience in *special* tooling and related production problems are yours for the asking. When the job requires *special* cutting tools call in your National Tool Co. representative. He is backed by more than 46 years experience in the engineering and manufacture of *special* cutting tools. His assistance is yours, without obligation, whether you're interested in one tool or a complete tooling program.**

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HARDENED & GROUND STEEL PARALLELS
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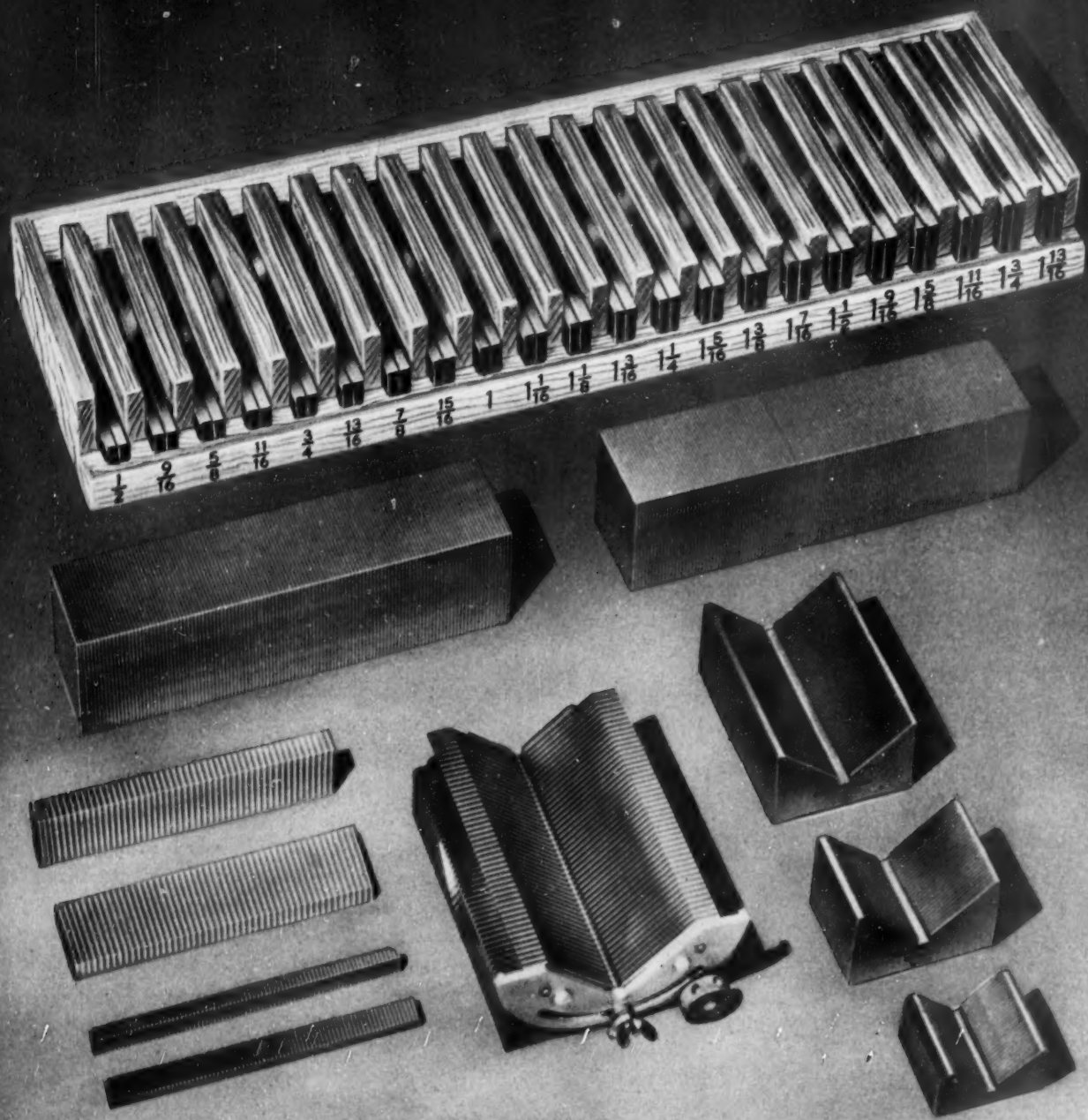

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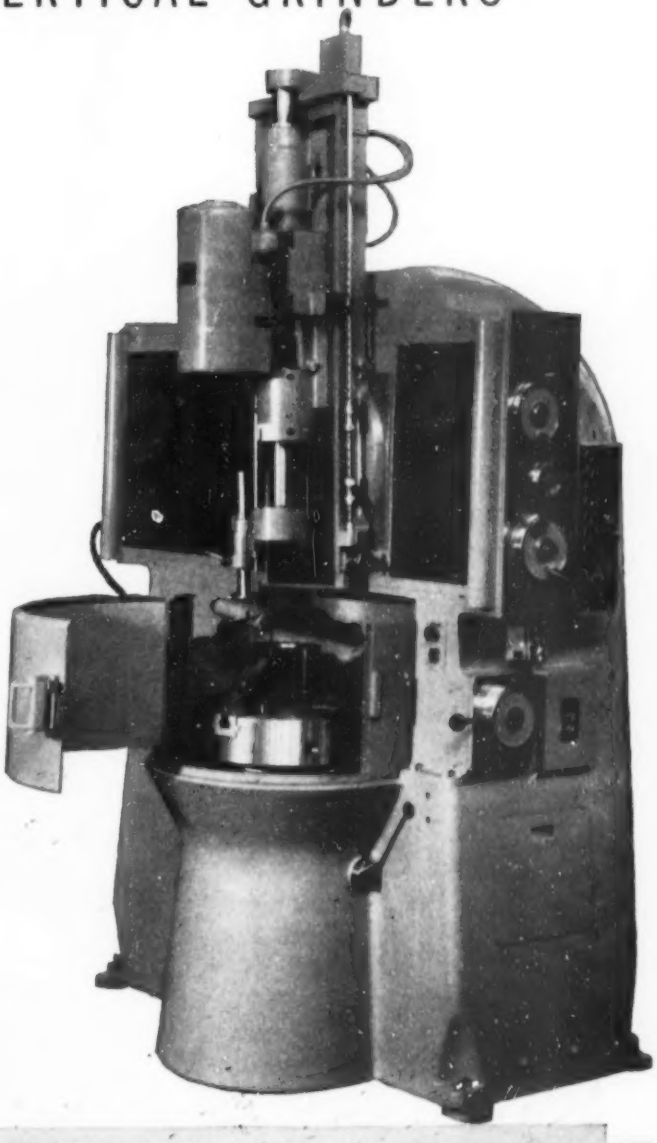

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to throw work out of line. Work sets solidly on vertical spindle . . . GREATER ACCURACY.

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All controls conveniently located at normal height; greater work visibility; easier loading . . . HIGHER PRODUCTION.

PLUS the added advantage of GREATER VERSATILITY

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THE PRESS THAT WORKED ITSELF *INTO* A JOB!

This KRW 150-ton motor-driven Hydraulic Press works all day—every day—testing dies made by Phinney Tool & Die Co., Medina, N.Y. Some of these dies are small enough to fit in the palm of your hand; others weigh up to thousands of pounds.

Phinney had one interesting experience that demonstrates the amazing versatility of this Press. They received an order for a series of 4 progressive dies from a maker of tank parts. Phinney made the dies, tested them, and shipped them. A short time later the dies came back. They were excellent, but the customer didn't have a press large enough to run them. Would Phinney put the dies in production on the same Press that made the sample parts? Phinney accepted. And this same KRW Hydraulic Press has since turned out thousands of tank parts in addition to its regular work of testing dies.

You'll find the versatility and rugged construction of KRW Hydraulic Presses can save you time and money on many operations in your shop. 25-150 ton capacities; one, two or three cylinders; hand, air or motor driven. Write us for complete specifications and prices. Dep't. 11.

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Designers and Builders of the Right Hydraulic Press to Solve Your Metal-working Problems!

Removal of Siliceous Volcanic Cinders — Redmond, Oregon

Caterpillar Tractor Co. Photo

The Invisible Background of Industrial Progress

In Redmond, Oregon, a siliceous volcanic mountain is being leveled by powerful Diesel bulldozers. The volcanic cinders derived from this opencut mining operation when mixed with asphalt or concrete produce an excellent non-skid surface for modern highways especially in mountainous country.

The use of Diesel powered bulldozers to push this material into piles for mechanical truck loading, depicts American initiative and the trend to utilize industrial machinery to the utmost.

The Bullard Company for over 70 years has progressively created and placed in practically all industries of the world, Machine Tools that have led the way to greater production. Machine Tools which have helped produce these laborsaving machines as well as the numerous industrial, consumer and luxury items that comprise our American standard of living.

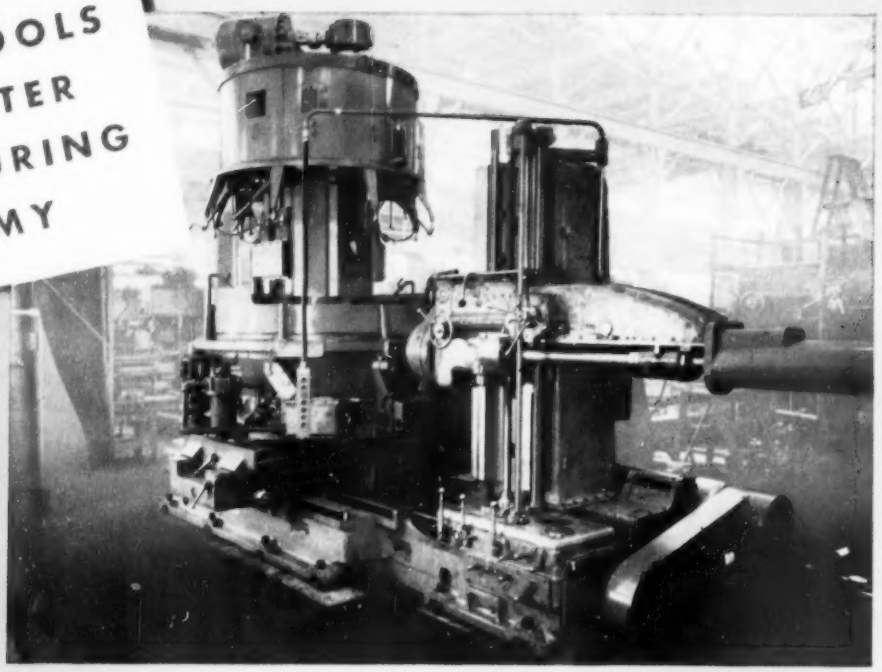
Bullard, through constant research and engineering, builds ★ *Modern Machine Tools* that are recognized for their accuracy, ruggedness, dependability, versatility and economy of operation. They are key production units for today's manufacturing plants.

★ *For greater manufacturing economy REFER to next page.*

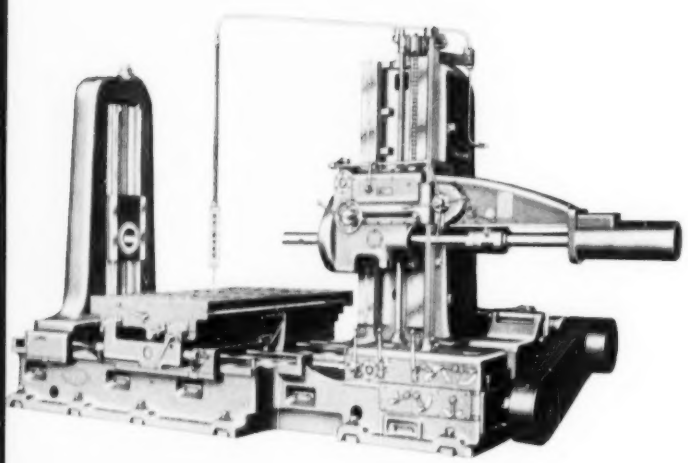
THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

BULLARD MACHINE TOOLS FOR GREATER MANUFACTURING ECONOMY



This 18½-ton Mult-Au-Matic was used to test the load carrying capacities of the Bullard 4-Way Bed Horizontal Boring, Milling and Drilling Machine.



The Table and Saddle were moved in all directions under feed and power traverse with this unusual load. All movements were extremely smooth without any tendency toward sticking or overloading the main drive motor.

This is conclusive proof of the load carrying capacity and operating smoothness of the Bullard 4-Way Bed Horizontal Boring, Milling and Drilling Machine.

BULLARD

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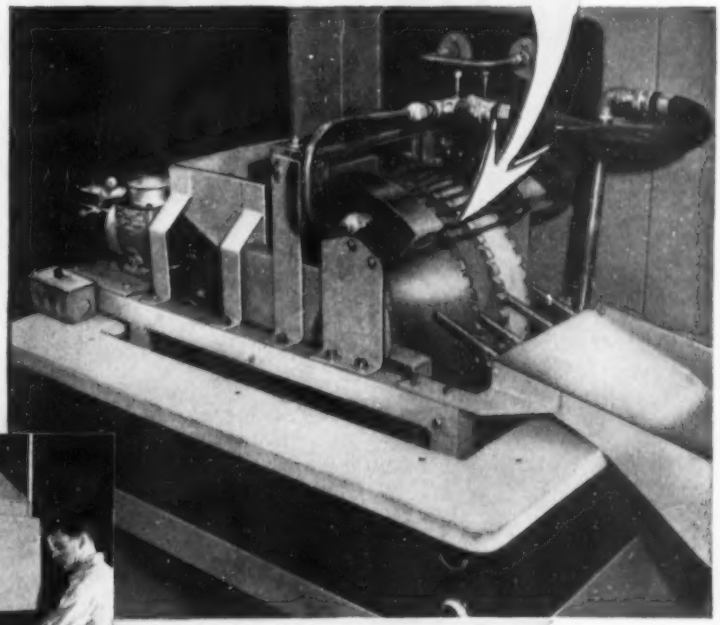
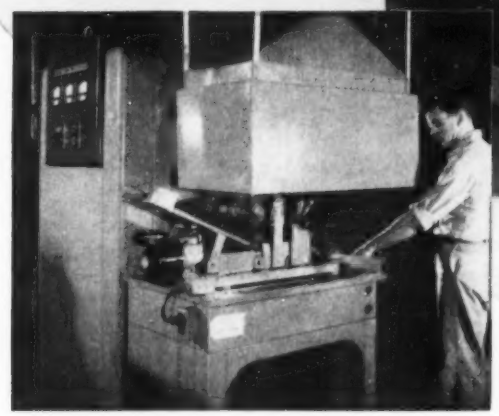
Fast!

ALLIS-CHALMERS Induction Heating

Hardens 3600 *Lifter Rods Per Hour*





Get high production like this with Allis-Chalmers induction heaters. In this application push rods are picked up from a hopper by a rotating wheel, conveyed through the coil, heated at both ends simultaneously, then oil spray quenched and deposited in a bin.

This same heater can be used for brazing, soldering, annealing, as well as case and through hardening. A simple switch from one work coil to another is all that's needed. Remember this! When coils are changed, there's no need for additional output transformers (needed on most units) which require special shielding and skilled help to install.

Cost of owning and operating an Allis-Chalmers induction heater is surprisingly low, too. Here's the cost per hour, not including labor:

	10 kw unit	20 kw unit
Tube replacement (5,000 hrs)	0.070	0.110
Fixed energy	.020	.034
Load energy 85% duty cycle at .01 per kwh	.170	.340
Water	.010	.032
Amortization 20,000 hrs	.244	.354
Total cost per hr.	**$0.514**	**$0.870**

High production, plus versatility, plus low operating cost make these Allis-Chalmers induction heaters important time and money savers. Find out what they can do for you. Call your nearby Allis-Chalmers district office or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3961

ALLIS-CHALMERS AC ALLIS CHALMERS

U·S·S CARILLOY Steel in rolled sections . . . . . .

LANDING FLAPS on the Model 340 Convair airliner slide on tracks made of CARILLOY 4140 steel T-sections. These tracks are much stronger than those formerly made from rectangular bars. And they cost 75% less!

lops 4 hours off machining time,

provides stronger flap tracks for Convair airliners

and cuts costs 75%

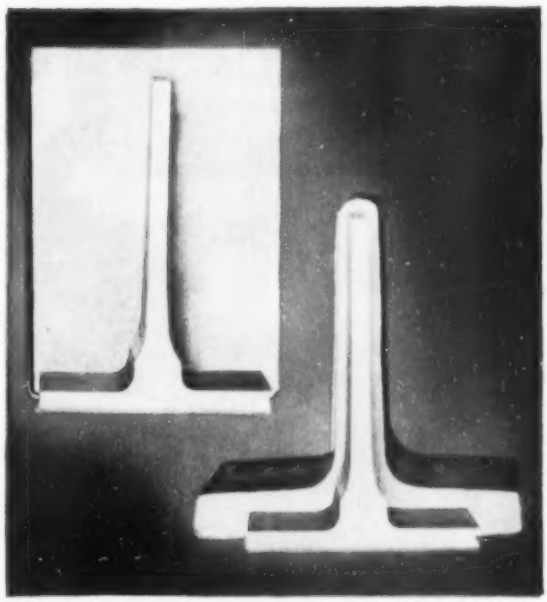
● Wing flap supports for Consolidated Vultee's Model 340 Convair airliners are stronger, cost *less*, and are of better quality now that they are made from hot-rolled sections of U·S·S CARILLOY steel.

When J. C. Peacock Co., of Los Angeles, California, started making these T-shaped flap tracks for Convair, the accepted practice was to machine them from $2\frac{1}{4}$" x $3\frac{1}{4}$" bars of alloy steel. But machining took a lot of time, and more than 50% of the stock metal was wasted in scrap.

Peacock and Convair engineers studied the problem and soon realized that they could shorten machining time and reduce scrap losses by fabricating directly from rolled sections. The question was, where to find a good supply of steel that would meet all the exacting quality requirements? Our Columbia-Geneva Division came through for them, by providing hot-rolled T-sections of CARILLOY 4140 steel.

This steel is giving excellent results. Not only are the CARILLOY parts *stronger* than those formerly used, but they require 4 hours less machining time, and reduce scrap losses 60%. What's more, finished tracks now cost only *one-fourth* as much as they did before.

Our experienced steel engineers and metallurgists may be able to help you make similar savings on *your* products. Call our nearest District Office. Chances are we can supply just the steel and the form you need.



LEFT, the T-shaped cross-section of a flap track in front of a $2\frac{1}{4}$" x $3\frac{1}{4}$" steel bar shows how much metal was formerly wasted.

RIGHT, the same flap track in front of the CARILLOY T-section that cuts scrap loss 60%.

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
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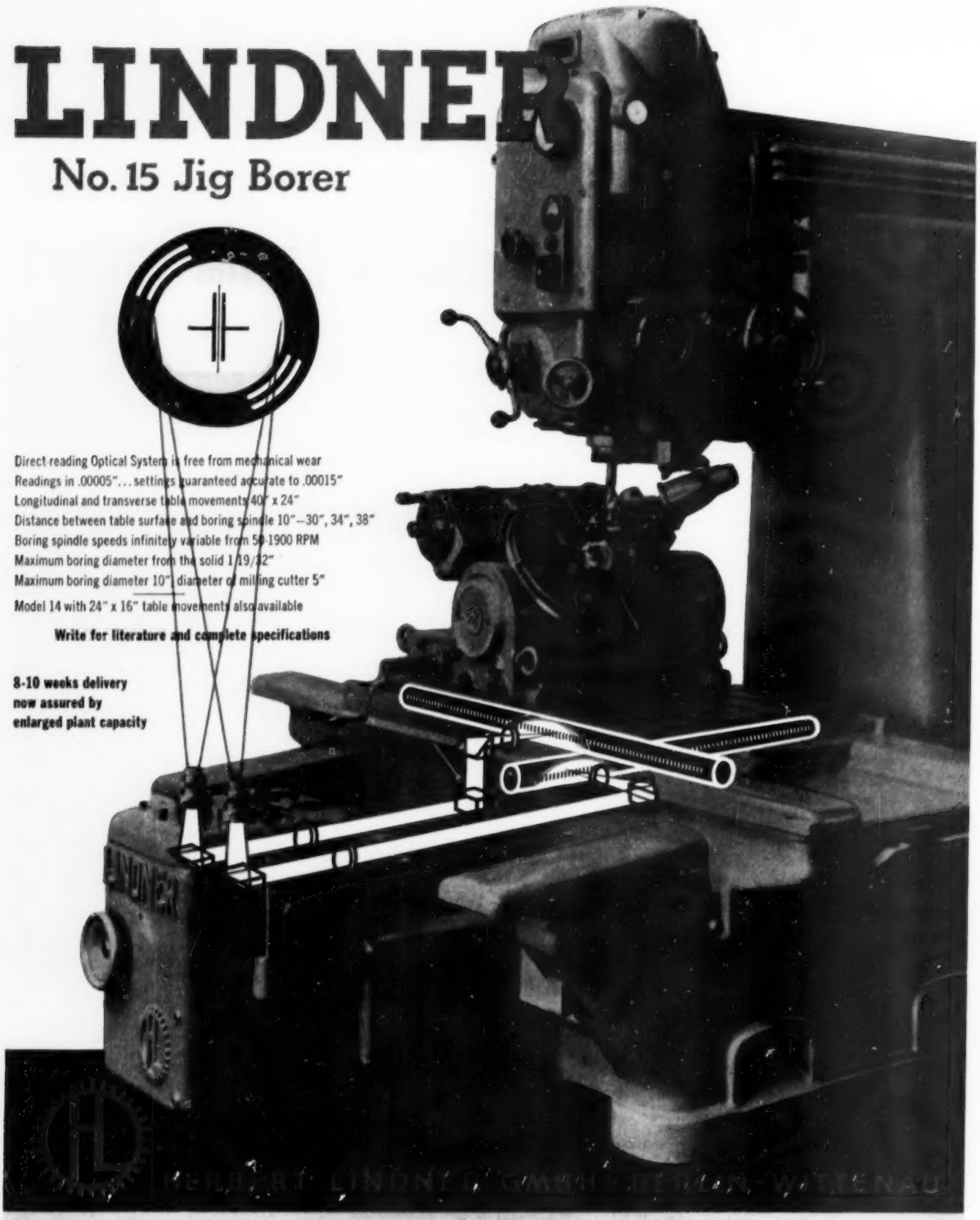

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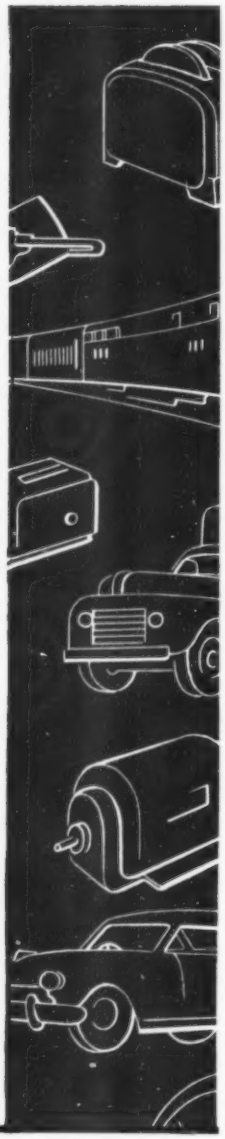

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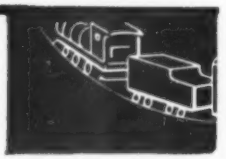
P-K point design makes sure the screw starts right, drives right. For example, by specifying P-K you can be sure of well formed, sharp gimlet points on Type A. With sharp point, P-K Type A stays upright, even when holes are misaligned—doesn't tip like a blunt point screw. It takes an extra operation, costs more to make the right kind of gimlet point, but P-K does it to give you fast, trouble-free assembly.



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WELL PLANNED IS HALF DONE

. . . but only half done, when you plan assembly. For screw failure can cancel all planned savings. That's why, to *insure* savings, so many fastening-wise manufacturers insist on Parker-Kalon Self-tapping Screws.

Since assembly expense is a sizable percentage of total production costs (in some products as much as 75%), they know fastening operations are a prime target for cost reduction.

Keep your assembly line trouble-free. Avoid screw failure, parts spoilage, high reclamation costs. Specify P-K Self-tapping Screws, and be *sure* planned savings pay off.

Remember

IF IT'S **P-K** IT'S O.K.

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NEW BOOKLET NOW READY

A handy guide to lower costs in assembly, filled with facts you need to start making savings you are missing. Ask your P-K Distributor, or write for Form 475-D. Parker-Kalon Corporation, 200 Varick St., N. Y. 14.

Be sure you get P-K STANDARDS in HEADS

Heads on P-K Screws are all full formed to exacting P-K Standards, concentric with shank. Slots are cleaned sawed—free from burrs—not too deep to weaken head, not too shallow or narrow to prevent proper seating of driver. You have to look close to see this detail, but the difference it makes on the assembly line shows up quickly. By specifying P-K you can be *sure* of uniform, trouble-free head design in every screw.

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Properly machine ground drills give better performance. OLIVER Drill Pointers with each lip doing equal work, give balanced cuts—more accuracy—more perfect holes—more efficiency—longer drill life.

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The ACE excels for grinding face mills up to 15" — also, slab mills • slitting saws • all types cutters and reamers.

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Efficiently powered by a 3 h.p. motor, this OLIVER Machine grinds on the periphery of a 20" wheel. Capacity: tools up to 1½" wide x 1¾" high from 0° to 20° clearance. The OLIVER is developed for production sharpening of single point Tungsten Carbide and high speed tools. offers increased production, lower tool costs and savings in man-hours. Extremely fine finish assured.

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EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

Thoughts in Passing

Some time ago (*AM*—Dec 22 '52 p133), there was an interesting account of reduction in temperature facilitating the drilling of small holes. It seems the usual method of doing the job resulted in considerable broken drills and lost time. An ingenious mechanic conceived the idea of reducing the temperature of the part by application of solid CO_2. The information will no doubt assist some poor soul in solving his fine-drilling problems in the future. Hence, the inestimable value in combing the pages of *AM* for constructive ideas that may not be of any immediate value but which can be called upon at some future date to assist in solving difficult production problems.

I haven't any small holes to drill at present, but I do have other difficulties which could have been eliminated had the article explained why the scheme worked. It may be that in finding that out we may have a clue of benefit to the solution of other machining problems. Perchance some structural wizard will advance the theory that the sudden chilling causes a high-frequency hula-hula during drilling. Who knows? Maybe if we could reduce the temperature to absolute zero, the holes would drill themselves!

John Homewood
Ontario, Calif.

Why Isn't "Good Enough" Good Enough?

A friend recently reported on an examination of Russian-made machine equipment, including precision machines and some which might be put in the class of road machinery, or even tanks. His report contains food for thought for those of us who have felt that "good-enough" was never good enough for our machinery; that we must have the best work in all parts of the machine.

According to this report, those parts which required accurate workmanship for proper functioning were all that could be desired. The workmanship was high class in every respect. In welding, for example, where accurate work was necessary the joints were splendidly done and showed high-class workmanship. But where this was not necessary, the

GRINETICS

BY D G SMITH

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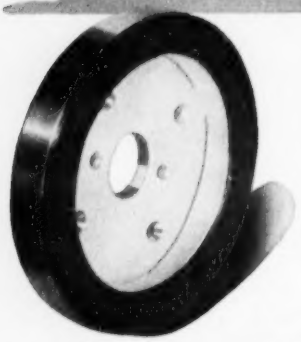

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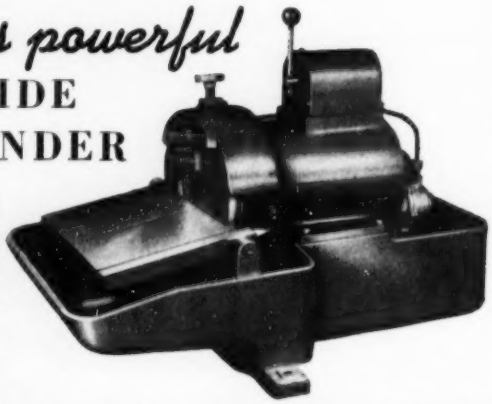
Wickman-Neven Steel-Bonded Diamond Wheels stretch wheel life —lower your carbide grinding costs because they're practically indestructible. They can't be damaged even by plunging sharp-pointed tools into them. Diamonds stay in place until worn to give more cuts per carat. These wheels also give up to 300% longer carbide tool service by producing a strong, uniform cutting edge that resists breakdown.

. . . and this powerful CARBIDE BENCH GRINDER



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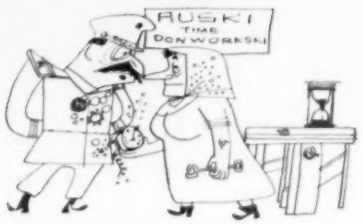


welding had evidently been done by inexperienced welders, probably learners. None of this, however, affected the working of the machine.

It is probable that Russia has a larger proportion of semi-skilled workers than most other countries. This being the case, is it not good management to utilize the skill available in the vital parts of the machine, and have less-skilled men or women do the work of which they are capable? Why spend hours of skilled labor on parts which do not require it?

We all like to see smoothly finished beds and frames on machines, even though they add nothing to its working. But this has cost a lot of money in years gone by. Has it been worth it? Has it inspired greater care on the part of machine operators or has it been a waste of time and effort?

Much of our waste of skilled labor can probably be traced to unnecessary tolerances put there by draftsmen who were not familiar with the working of the finished machine. For there are some cases where what we would normally call a poor fit may be best ,or at least satisfactory, for some particular place. Have we let personal pride go too far in adding to expense?

I have heard many discussions regarding the necessity of keeping all work at the highest grade, and of the effect of allowing two or more grades of work in the same shop. But I recall a shop devoted largely to maintenance and similar work which was deliberately divided into three sections. One for the highest-precision work, the next for what we would normally consider high-grade work, and the last for work where a considerably lower grade of workmanship was perfectly satisfactory. Each section had its own machine equipment and its own foreman. Every job was looked over as it came in, and the various parts assigned to the shop best fitted to handle it. Highly skilled men were not asked, or allowed, to do work that could be done by those with less ability. Each man handled the work for which he was best fitted, and with very satisfactory results.

It is possible that managers of Rus-

sian shops making machines with varying qualities of work, have adopted a similar plan. If they can produce machines of any kind, which serve their purpose, by utilizing only a fraction of the highly skilled labor thought necessary elsewhere, they will have to be considered carefully when we are estimating the product that can be expected from the various countries. It may be possible that we are using higher skills than necessary in some of our work.

Fred H. Colvin,
Point Pleasant, NJ.

Nylon Chips

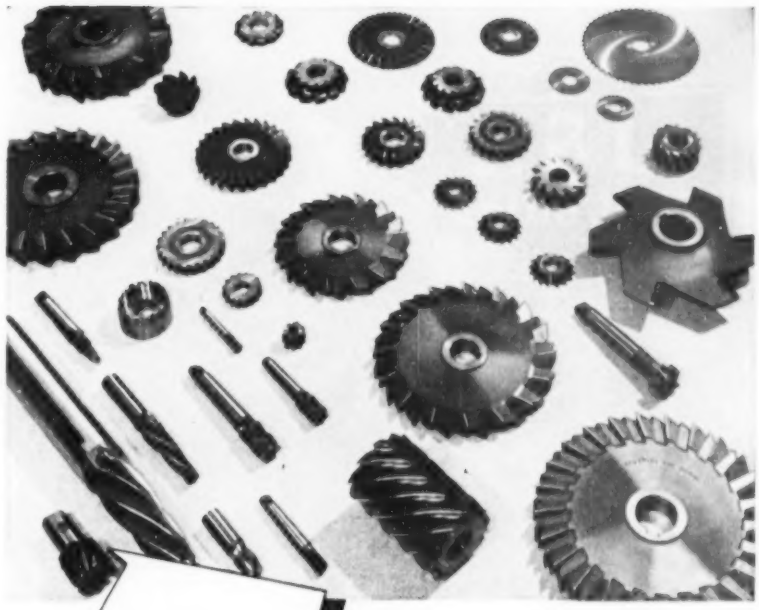
In your Backlash column (*AM*—Dec 22 '52, p74) you have a note, "Nylon Trouble." As we are currently machining hundreds of different parts out of nylon, we have devised a method of eliminating chips from the finished pieces. You might be interested in passing this along to Arthur Rogers, of Buffalo.

We use a container, about the size of a 2-qt jar, with a tight-fitting lid perforated with holes slightly smaller than the finished pieces. We fill the jar with the pieces entangled in the chips, and inject compressed air. Pressure of the air jet separates the chips and forms them into small balls which can be easily removed. Sometimes, chips come out of the small holes, so we recommend taking care to prevent flying pieces from getting into the eyes.

On some parts it is possible to use a mechanical means of chip breaking on automatic screw machines. We have found that by oscillating the tools by the use of a serrated cam, it is possible to obtain small chips instead of one long chip.

We hope this suggestion can be used to advantage by Mr Rogers; however, if he has further trouble please let us know, and we will be very glad to assist him.

R B Zimmerli
Tech Service Mgr
The Polymer Corp of Penna



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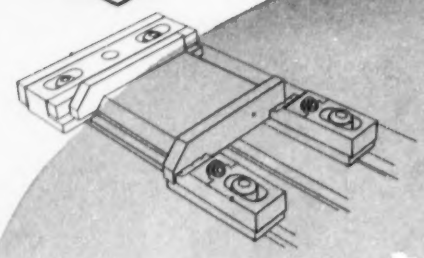

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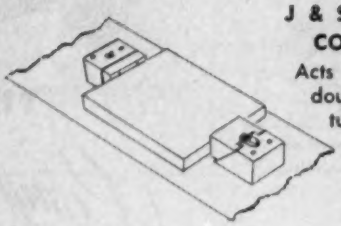
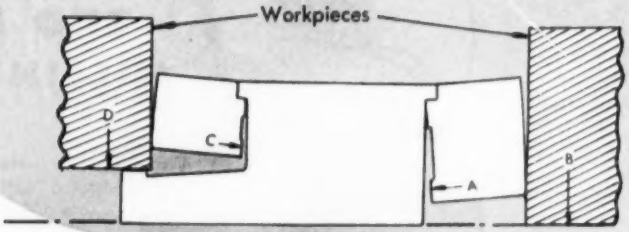


J & S DOWN-HOLDING COUNTER CLAMPS

Acts on same principle as double ½ vise (left). Fixture clamps operate on the same principle as the all purpose jaw clamps.



Approximately 3 tons pressure closes Gap A, and approximately ½-ton closes Gap C—producing a down-holding action on each respective piece of approximately the same force.

Hinged, Spring-Loaded Jaw Gives Positive Down-Holding Action

Hinged lip in-and-down action combined with in-and-down action of clamp holds workpiece against table and absolutely parallel. **Construction is of oil-hardened tool steel, ground and blackened.**

Jig Borers—quickly set up for jig-boring accuracy.

Millers—eliminates heavy miller vise and allows milling of more pieces.

Planers—eliminates strap and finger setups.

Shapers—eliminates vises.

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—contains complete details on advantages, applications, types and sizes available.

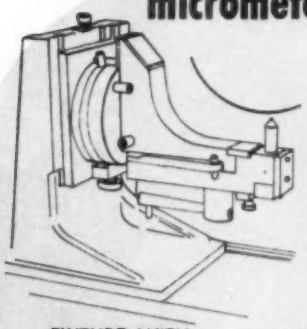
Milling 10 pieces 1¼" thick in one setup

model "REC" with detachable micrometer base

.0001" ACCURACY *Fluidmotion* WHEEL DRESSERS

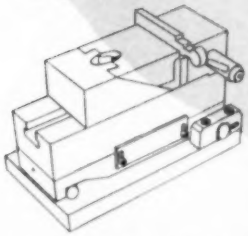
dress two angles tangent to a radius in one continuous motion

High-Carbon, High-Chrome Construction

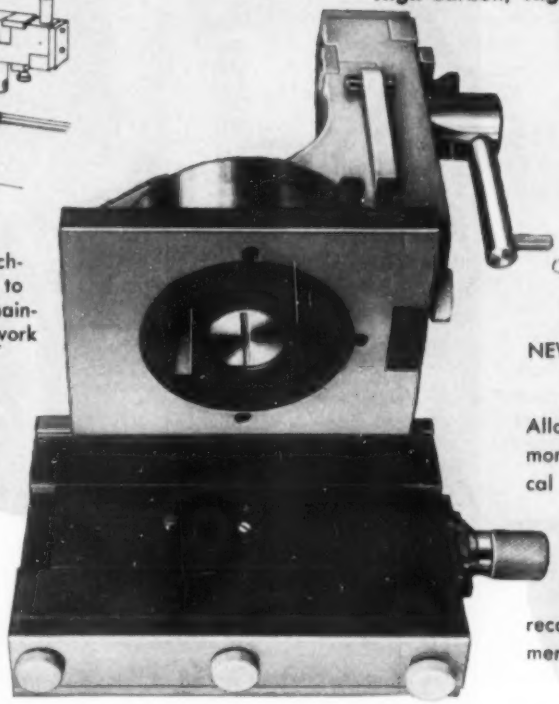


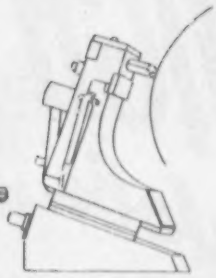
FIXTURE WITH MICROMETER FEED

Under the wheel attachment makes it possible to dress under the wheel, maintaining any desired work height.



Precision Grinding Vise with or without sine bar allows rapid unloading and exact relocating.





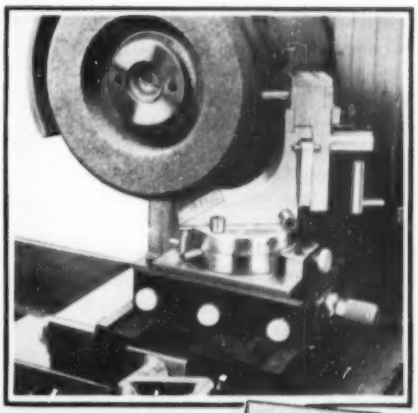
NEW SOLID ANGLE RAMP WITH MICROMETER LEAD SCREW

Allows fixed position of diamond when used in cylindrical grinding for dressing above the center line, but coincidental with the center line of the wheel. Factory will recommend proper equipment on request.

Adaptable to All Types of Cylindrical and Surface Grinders

By loosening gib, dresser can be removed from the micrometer "C" Base and affixed to solid or adjustable angle ramp for cylindrical grinding. For surface grinding the dresser is returned to "C" Base.

Photograph on right shows special compound base with micrometer lead screw having travel in four directions. Dresser usually is furnished with extra stops for zero setting.



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J & S TOOL CO. INC.

A variety of models and attachments to suit your needs. Write for free catalog covering dressers in detail. J & S also manufactures a complete line of All-Purpose Jaw (machine) Clamps, Vises, and Special Tools. Write for Machine Shop "Time Savers" booklet.

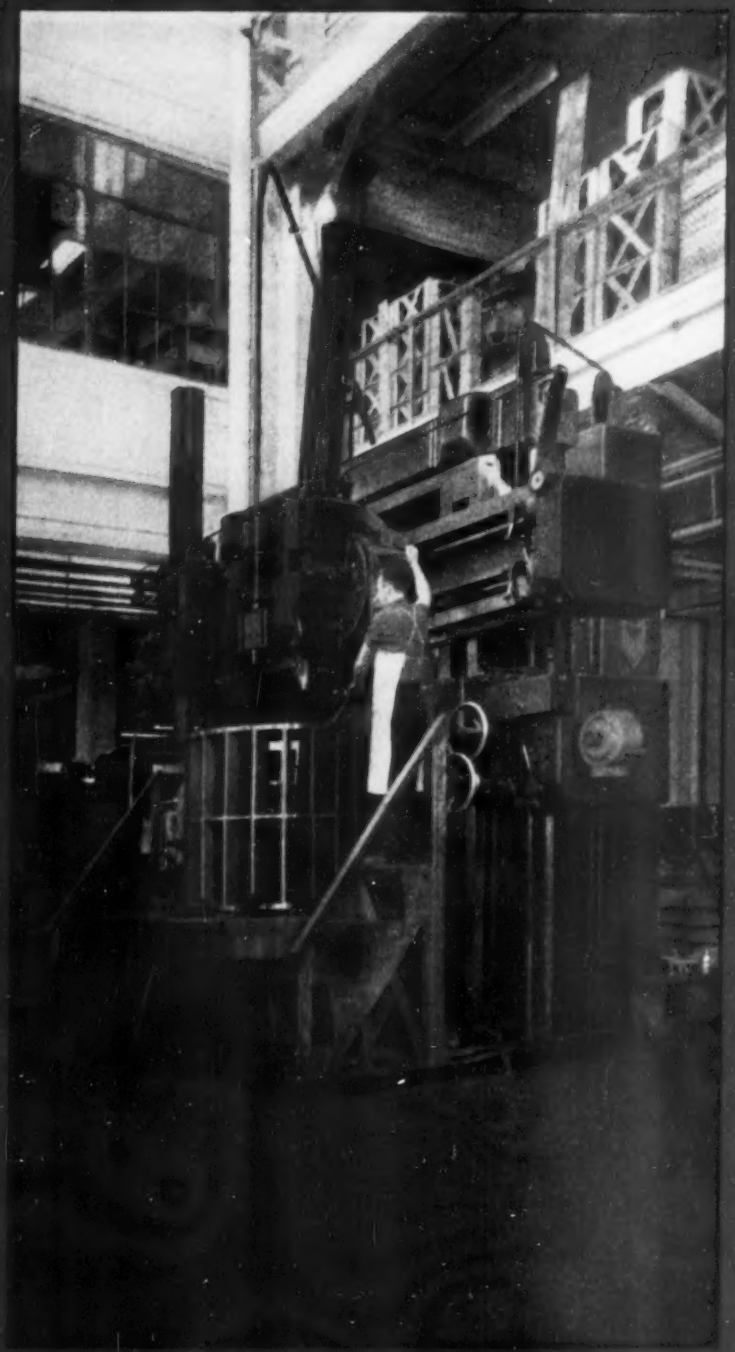
King is "Tops" on the HIGH Jobs

Here is a good example of how traditional KING ruggedness and accuracy can make a routine job out of an exceptionally difficult machining operation.

These "high" jobs tend to amplify any shortcomings in table bearing design. This is particularly so where the part is not only tall but a flimsy weldment. The support provided by a costly, specially-built fixture would compensate, at least to some degree, for lack of rigidity in the part—but the wide diversity of jobs run across this machine made it uneconomical to use other than the simplest of hold-down clamps. Since the machine is a KING . . . *extra*-husky, *extra*-rigid, *extra*-accurate . . . this support is entirely adequate and the customer is able to obtain excellent results in spite of the difficulties involved.

What have we here? Just one more bit of "on the job" evidence added to a multitude of reasons why it will pay YOU to get the facts on

KING VERTICAL BORING & TURNING MACHINES



SEND FOR CATALOGS

KING machines are made in five sizes, all available in various head combinations. Catalog K-1 covers machines sizes 20", 36", and 42"; K-2 sizes 25", and 29"; K-3 sizes 50" and 100"; K-4 sizes 120" and 144". Please specify sizes of machines in which you are interested.

American Steel Foundries

KING MACHINE TOOL DIVISION

1150 TENNESSEE AVENUE CINCINNATI 29, OHIO

SPOT NEWS of Metalworking

- **Fiat is expected to spend around $2 million for U.S. machine tools** for tooling for production of Allison turbo-jet engine parts. Mutual Security Administration is financing the purchases.

- **Creep resistance to 660 F without high-temperature heat-treatment** gives special importance to the ZT1 magnesium-zinc-zirconium-thorium alloy developed by Magnesium Electron Ltd. Dow Chemical Co has signed a license to produce this alloy in this country. The alloy is particularly suitable for jet-engine castings.

- **General Motors' demand that its five-year contract** with the UAW-CIO be extended another year, until May 1956, has been prolonging negotiations between the two. Such an extension would relieve General Motors of having to take the lead in automobile industry negotiations in 1955.

- **Norton Co is planning a major program for crankshaft grinding** with transfer-type automatic equipment. It includes unit-type multi-slide machines with automatic work-handling mechanisms. Plans were revealed at an Editor's Preview of Norton's new grinding machine plant at Worcester, Mass, on March 31. See story on page 201.

Magnesium automobile bodies rather than plastic are forecast by R J Cross of Essex Aero Ltd. A magnesium body weighing 132 lb on an Allard car was one of the highlights of the first International Magnesium Exposition (see page 200).

- **Congress may reverse the Labor Board decision two years ago requiring employers to bargain,** during the term of a labor contract, on any subject not covered by the contract or discussed in earlier negotiations. A Taft-Hartley amendment, with that aim, introduced by Senator Ives of New York, has strong support.

- **Major refrigerator maker has bought nearly $1 million of injection molding equipment** with which to produce plastic liners for refrigerators. Advocates of steel assert that plastic liners will be subject to locked-in stresses and possible breakage eventually through careless assembly.

- **Jet-engine noise, which may reach the "threshold of pain" (130-150 decibels) on take-offs,** must be licked before commercial jet liners can be operated at low altitudes over cities. Navy is concerned about the problem too, because carrier-deck crews are exposed to ear-shattering roars for considerable periods.

- **Demand for air-conditioning units for automobiles,** even at $600 or more per unit, is larger than expected. About half the Cadillacs to be delivered in the South this year are likely to be so equipped, if production can keep pace with demand. Even sales in the north are ahead of anticipated volume.

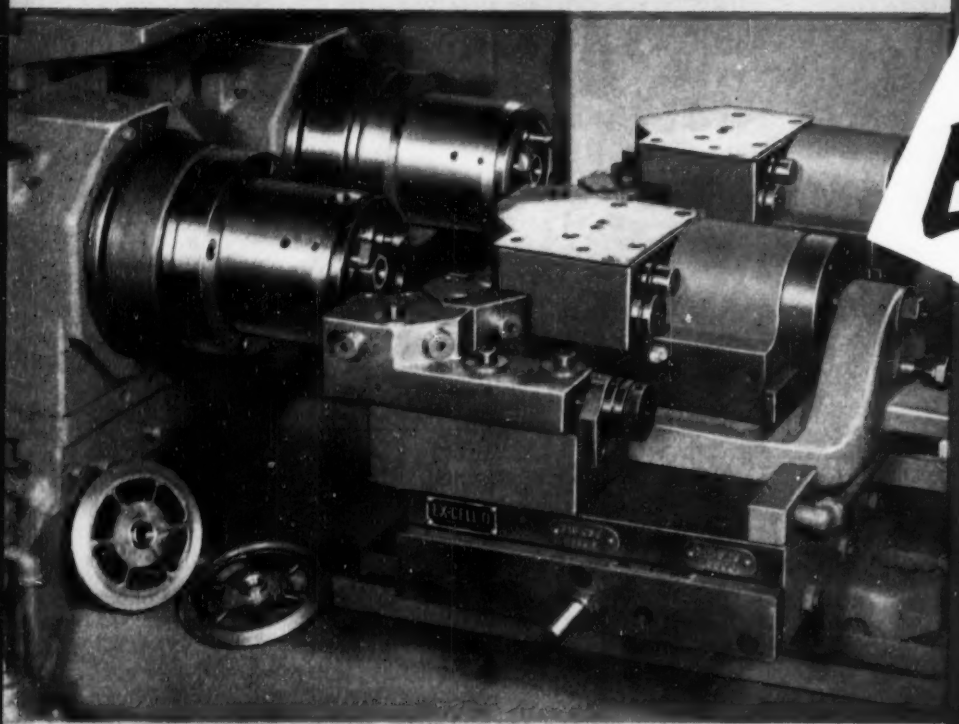
Defense Department has cut back its plans for spending $500 million in fiscal 1954 for long lead-time machine tools (the elephants). Truman budget carried that amount for that purpose. Budget Bureau has asked Pentagon to supply by April 15 the list of "elephants" that it wants. Up to now no list has been presented.

- **Two-weeks' training program for teaching women in operation of grinders,** turret lathes and other metalworking machinery is described in Women's Bureau (U.S. Labor Dept) Bulletin No. 245. It describes plan being used by an aircraft engine plant.

- **Boeing is rebuilding World War II machine tools at a rate of 17 a month** at its Wichita, Kan, plant. During 1953 its machine-maintenance department rebuilt 144 machines. Average time for rebuilding: 30 days. A similar rebuilding program on a smaller scale is under way at Boeing's Seattle plant.

8 Surfaces Finished In One Cycle . . .

PRECISION MACHINING the EX-CELL-O WAY



LEFT: Ex-Cell-O 2112-A Precision Boring Machine equipped for finishing eight surfaces of die cast aluminum parts. Work pieces in left foreground.

Sectional view of work showing operations in heavy lines.

Flexibility, economy, and high production are all yours with Ex-Cell-O 2112-A Precision Boring Machines. Shown here is a typical use that may suggest a money-saving method for your shop.

Ex-Cell-O engineers designed chucks that clamp die cast aluminum parts by the fins to solve two problems: (1) clamping frail parts without distortion; (2) boring the I.D. and turning the O.D. in one machine cycle.

The operations, performed on two parts simultaneously, include boring inside diameter; chamfering outer edge of bore; turning outside diameter and pilot diameter; facing the small hub and area between outside diameter and pilot diameter; and chamfering outer edges. Net production is 102 per hour.

It may be that a versatile Ex-Cell-O machine of this type is the answer to your machining problem. For full information and specifications, contact your local Ex-Cell-O representative, or write Ex-Cell-O in Detroit today.

Ex-Cell-O Style 2112-A Precision Boring Machine.

XLO

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MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS
DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

Washington

Secretary of Defense Charles E. Wilson is advocating a narrowing rather than a broadening of the war mobilization base.

There will be fewer sources of supply for each military item than heretofore, if his ideas prevail. He believes it more efficient to give larger-run contracts to two manufacturers, let's say, than to divide the same volume among five companies.

• • •

His policy would be to get away from so much coddling of small business. Defense contract awards would be less influenced by "depressed labor areas" and more by production efficiency.

He is not in favor of making a sort of glorified WPA out of the Defense Department at times.

Mr. Wilson thinks the time has come to examine critically the mobilization base. And one thing is sure: All plants tooled up now should not be put into a standby status.

Plans now call for too much theoretical defense capacity to suit him.

• • •

Just what his views will do to the Vance plan is not clear. The fact is known, however, that he does not favor spending the entire proposed sum of $500 million for long lead-time machine tools for standby purposes.

He strongly supports the plan for dual-purpose plants that he first proposed two years ago. General Motors has two of them under way at present.

These plants would be tooled to make both civilian goods and military items.

Mr. Wilson wants the military production tooling in these plants kept up-to-date.

• • •

Something new has been added to Washington's alphabetical jargon: DMS (stands for Defense Materials System). This is the government's news metals priority scheme, scheduled to take effect July 1, when the more-elaborate Controlled Materials Plan expires.

Although there's no authority on the books for DMS at present, NPA has already issued two regulations outlining its operation.

• • •

Here's how it will work: Defense Dept and Atomic Energy Commission will issue quarterly allotments of steel, copper and aluminum to their prime contractors, who will also get preference ratings for tools. These priorities will be passed on to sub-contractors and suppliers.

NPA will direct steel, copper and aluminum producers to set aside specific tonnages for defense-rated business.

Probable industry-wide set-asides for third quarter: steel 15%, copper 25%, aluminum 30%.

Priorities will also be issued to selected defense-supporting projects, but the government will be stingy in this regard. AEC and the Pentagon will have to certify specific manufacturers or construction contractors for this type of rating.

That's all there is to DMS. There are no controls or priorities on steel, copper and aluminum for non-defense consumers.

• • •

Defense budget cuts have already taken shape. You will be able to see the Eisenhower-Wilson defense budget when it goes to Congress some time this month, according to present plans.

• • •

First signs of cutbacks are in aviation production. A principal Navy plane supplier got a $300 million cancellation on one plane scheduled for delivery in 1955. Defense is also saving about another $100 million on spare jet engines. Reason is that jet engines are now showing longer life so less spares have to be ordered. The entire jet engine program—for spares—was cut in half by the Pentagon.

• • •

Talk about cut backs in the heavy press program has calmed down. The Air Force had flooded Washington with scare stories that defense economizers were about to force reductions in the program to build 17 giant hydraulic presses for production of metal aircraft framework. Supporters of the program argued that there would be no savings and that the program had advanced too far for effective cut backs. This is now the feeling, too, at ODM, where civilian mobilization planners seem ready to defend the Air Force Program.

• • •

The Rockefeller Committee is working on a Defense Department reorganization plan due April 30. They will probably recommend abolition of the Munitions Board, which Wilson figures is a fifth wheel. Munitions Board functions will largely be transferred to the Office of Defense Mobilization, a civilian agency. Another change: elevation of Frank C Nash to be Assistant Secretary of Defense for International Affairs. Nash is now Assistant to the Defense Secretary. The boost up the ladder would give him more power to handle NATO and similar military requirements.

• • •

A tighter amortization policy may be in the works. It would grant fast write offs to defense plants only if the owner will agree to build under a dispersal program. That would mean not just a move to the suburbs but a complete relocation away from large industrial centers. Treasury and ODM are studying the program.

FOR PRECISION

PLUS PRODUCTION . . .

PRECIS-O-NIZING

OLD mass production methods are not enough to satisfy a market that is demanding both *quality* and *lower prices*.

Only through modern precision-production techniques can a manufacturer hope to use this two-edged sword to his own advantage!

Because of this need for a productive method of generating precision . . . the Microhoning process was evolved. For a quarter of a century the Micromatic Hone Corporation, working with industry, has led the honing field in the development of equipment that would productively finish parts within the ever-shrinking tolerances of new designs and standards.

This applied precision-adeptness of the Microhoning process is "PRECIS-O-NIZING".

In one economical operation Microhoning abrades stock rapidly and efficiently with a minimum of heat to generate—

—bores that are round and straight
—accurate diametric size
—a functional characterized (cross-hatch pattern) surface finish that is free of smeared or distorted material.

The processing of sewing machine parts is an example of PRECIS-O-NIZING.

Microhoning equipment is available to handle all kinds and sizes of parts . . . from soft non-ferrous metals to hardened steel and special alloys . . . from .078 to 60 inches in diameter and from ¼ inches to 75 feet in length.

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Detroit

It's been a long time coming, but outright, no-holds-barred competition is breaking out all over the auto industry.

Witness recent events, unparalleled in the postwar era. All four Chrysler divisions, moving into the spring market when the buying public traditionally displays its greatest interest, cut prices on every single car and truck, with the exception of four Chrysler limousine models. The reductions on passenger cars averaged about $100; those on trucks, about $40.

While Chrysler was going after competitors from the price angle, Ford was pulling out all the production stops. In March, Lincoln-Mercury division added second shifts at its three assembly plants. L-M's goal: To double production schedules. Ford division, meanwhile, is on a 6-day week, pushing hard to bring daily output up to about 4300 units or better. GM was doing the same; some of its Fisher fabricating plants went on double shifts.

Chrysler's announced reason for its price reduction was that this corporation intends to cut out for itself a bigger piece of the sales melon. But the Chrysler move was not followed by its competitors.

The logical conclusion—which, of course, is being meditated carefully by all manufacturers—is that production quite possibly is out-distancing sales. With production totals mounting week after week, it is about positive that output for the first half of 1953 may set a new record.

Competitive effects of the Kaiser-Willys merger cannot yet be readily measured. There is little likelihood that the consolidation will upset current standing among the independents in the near term. However, Kaiser and Willys will be able to tighten up their dealer organizations if they choose to do so, as well as make more efficient use of the production facilities now available to one another. In the long run, Studebaker, Nash, and others may be pushed hard by the Willow Run-Toledo combine.

With Kaiser-Frazer so active in aircraft production (over the last year it has been building C-119 and C-123 cargo planes, as well as components and structural parts for other aircraft), the company's acquisition of Willys-Overland takes on added importance. Reason: Willy's drop forge division in Toledo is the third largest commercial forging operation in the world. Its importance to a company engaged in aircraft production—and lacking forging facilities—is, of course, tremendous.

On the civilian goods side, the major shift resulting from the Kaiser-Willys linkup is likely to be (and before long) transfer of Willys stamping work to the Willow Run plant. Many Willys body stampings are now made by Murray Corp.

Jet engine cutbacks at Buick have reshuffled plant operations inside General Motors. A subassembly plant Buick was building for this job at Flint is being turned over to the Ternstedt division for dual output of defense and auto hardware parts. Of the 1,800,000 feet available in the plant, about a half-million will be leased by Ternstedt to Buick. At least a fair amount of equipment purchasing is expected from Ternstedt as a result of this switch.

• • •

There's another fair market developing at General Motors for shop equipment. The corporation is establishing 35 service training centers throughout the country for localized training of dealer mechanics and other dealer personnel. Each center will have 22,000 sq ft of floor space. Total cost will be in the tens of millions.

• • •

If you are looking for a faster, more accurate means of measuring wear on moving metal parts, you might do as Ford Motor Co and other auto makers—have the part made radioactive at a government atomic plant. At Ford, for instance, piston rings made radioactive at Oak Ridge, Tenn, are given short runs in stock car engines. The motor oil is then drained and placed near a Geiger counter. Disturbances registered by the Geiger counter indicate the amount of wear on the ring. Previously, rings were weighed and run in the engine; then the engine was dismantled, the rings removed and weighed again to determine wear.

• • •

Chrysler Australia, Ltd., at Keswick, is producing from the largest hydraulic press in the Southern Hemisphere. English-built by John Shaw & Sons, this 8,000-ton rubber die unit is stamping out sections for Canberra Jet Bombers and the Australian designed "Jindivik" pilotless jet target aircraft. The gross weight of the press is 260 tons.

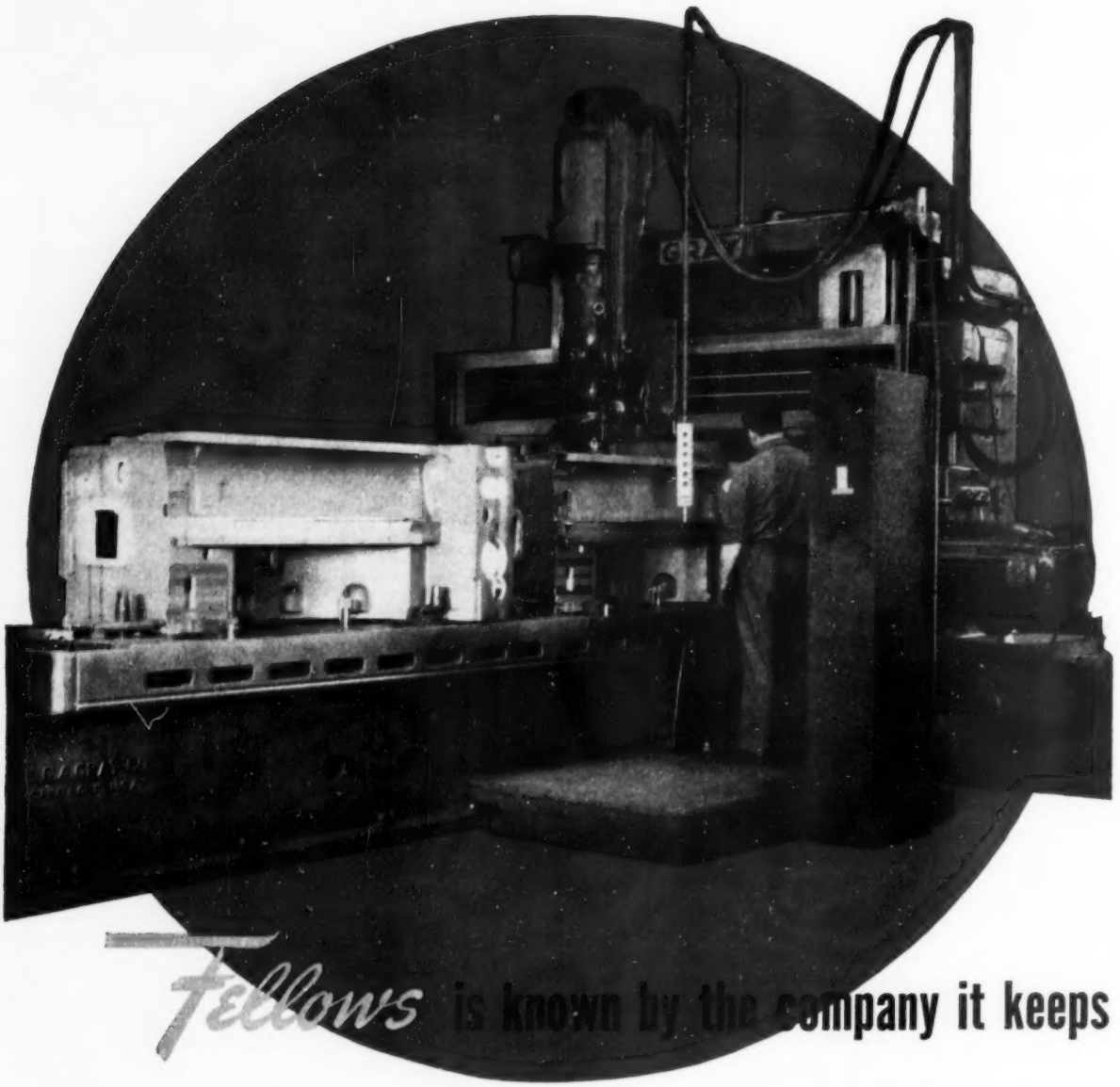
• • •

Carboloy's new Minimum Tool Inventory plan merits some study. With MTI, you can inventory 11 specially-selected standards and thus do up to 80% of your single point machining jobs—the 11 tools are assorted so as to permit grinding to most specs in your tool room.

• • •

Carboloy, incidentally, is getting more and more business for its magnets. The order backlog is growing steadily.

That's not untypical of much of the capital goods industry these days, at least around production-happy Detroit. One major executive said: "I don't know where it's coming from, but incoming business is at a most remarkable level."



Fellows is known by the company it keeps

The Fellows Gear Shaper Co., Springfield, Vt. is universally known for building top quality products . . . using advanced methods and the most modern equipment. Fellows' modern machinery includes this new GRAY 48" x 48" x 16' Milling Machine, which is ideally suited to their fast, high production requirements. GRAY's modern speeds are demonstrating in hundreds of shops, that jobs don't grow old on a GRAY!

GRAY self-contained Unit Heads permit high horsepower cuts with speeds from 10 to 1000 instantly available by the flick of a lever.
Large facing cutters and small end mills can be run simultaneously at efficient speeds and at high feeds on a GRAY.

Write today • get the story on **HIGH** low cost **PRODUCTION**

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planers • milling planers
planer type milling machines
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Machine Tools

Machine tool orders continue to surprise everyone. They come more from civilian-goods manufacturers than from defense contractors. Rated business is dropping off considerably.

Several special-machinery builders have been swamped with orders. One, for example, has an orderbook carrying it into 1955. The bulk of the work is for the automotive industry, but farm implement companies have done some buying, too.

• • •

The unusually large volume of incoming orders thus far this year has influenced important people in the machine-tool industry to raise their sights for 1953.

Total production for the industry probably will be around $1 billion. Earlier guesses had put it nearer $800-$850 million.

The industry came up to 1953 with a backlog of around $1 billion.

It has a good chance of running up orders this year close to $700 million. Automobile companies will be at the top of the list of buyers.

• • •

Come June 30, what's going to happen to machine tool controls?

The answer isn't hard to find. Unless something new appears to upset the plan, the present rather elaborate arrangement will be dropped completely.

An order is now being written to take the place of the celebrated NPA Order M-41.

It will call for a simple DO rating for a machine tool for defense work. The 60-40 or 70-30 ratio will disappear.

• • •

There will be no special rating given machines for the armed services as against machines for the atomic energy program, let's say.

Machine tool builders probably will be required to accept up to 50% of their total output in rated business. It is doubtful whether more than a handful will then be booking that many defense orders.

The problem will be to impose rulings that will make it undesirable or impossible for buyers of all kinds to get DO ratings.

• • •

Ford's plans for expansion and modernization are broadening rather than narrowing.

Latest news is that its outlay for new equipment and plant facilities the next few years will hit $500 million.

A new stamping plant is reported to be part of the Ford program. It probably will be two-thirds the size of the Buffalo plant. Exact location has not yet been chosen. Orders for presses will not be placed for some time.

Ford still does not have the engine-building capacity that it is confident it will need over the next five years.

The Ford people feel that they have Chevrolet "on the run" and it is only a matter of time until they are No. 1 in the industry again.

Ford's main concern is to be sure that machine tool builders can absorb the Ford program into their production schedules satisfactorily, once the placing of orders begins.

• • •

Metalworking Equipment Division of NPA is a mere shadow of its former self.

It is down to 50 employees. Last November it had 122 men and women. At the peak it had over 200 on its payroll.

It is destined to be pared down to 40 by April 25. The division is a silent spot compared with the bustling activity that prevailed there for many months.

• • •

Turkish Mission is in this country to secure bids on $1 million or more U.S. machine tools for arsenal in Turkey that will produce ammunition for U.S offshore program. A large extrusion press will be among the items bought.

Awards for other offshore contracts are likely to be made soon.

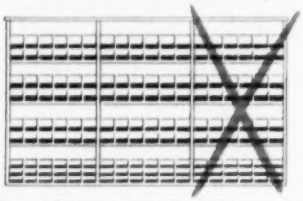
BF

MACHINE TOOLS

NEWS ABOUT CREATED-METALS

Are Industry Inventories too High?

Business Week recently stated, "Don't underestimate the inventory problem. If a recession starts anytime in 1953, stocks of goods are likely to be at the bottom of it." *Iron Age* pointed out that, "hottest subject in automotive circles today is reducing tooling costs and shortening the tooling time cycle."

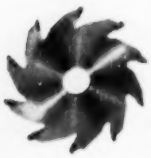


Informed sources in the field say that the Carboloy Minimum Tool Inventory Plan (described on these pages) is a forward step in answer to these problems as far as cutting tools are concerned.

★ ★ ★

Woodcutting Saws to Get New Teeth

The Carboloy organization has recently standardized production on 20 solid tungsten carbide tips for circular woodcutting saws. Saws with these carbide tips will soon be available from a number of saw manufacturers and offer phenomenal production increases over steel blades. Tool manufacturers can obtain details and prices by writing for Bulletin W.W.-53-1, Carboloy Department of General Electric Company (address at right).



★ ★ ★

Communications Given Boost by Magnets

Because they help eliminate costly, bulky coils, Carboloy permanent magnets are being used more and more in communications equipment. The list includes loudspeakers for shops, radio, TV . . . other electrical components in telephones, transmitters, phonographs, hearing aids, etc.

These are the same Carboloy permanent magnets shop men find so useful for separating sheet steel, retrieving tools, holding jigs and doing other handy, timesaving jobs.

YOUR CARBOLOY SALES REPRESENTATIVE SAYS . . .

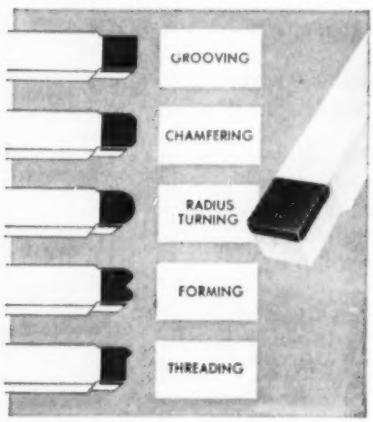
"Let us show you how up to 1/3

"OUR Minimum Tool Inventory Plan is the answer. It's an easy-to-adopt plan *that works!* Under it, you stock a basic number of low-cost Standard Carboloy Tools in place of many costly "specials." The proposal shows you how to adapt these Standards to almost any single-point tooling job . . . simply and quickly. You use your regular carbide equipment. You'll cut down production delays. You'll reduce your inventories *30% or more.* Read about it on these pages . . . "

1 What are Standard Carboloy Tools?

They are high-quality carbide-tipped single-point tools for turning, boring, facing and other machining operations. They outlast high-speed steel tools as much as 10 to 1 . . . will operate at machine speeds up to 4 or 5 times faster than ordinary tools.

There are only 11 styles of Carboloy Standards. They can be used "as is," or ground – in minutes – to do up to 80% of your single-point tool machining jobs. Carboloy Standards are as near as your phone, too. They are stocked in your area by Authorized Carboloy Distributors.



2 Here's how they adapt to your jobs.

At left is a style C Standard Carboloy Tool – one of the 11 styles. Note the generous-sized carbide tip. It can be used "as is" for some jobs . . . or adapted to meet any number of your special tooling requirements (as the 5 typical, adapted shapes at left, for example).

Carboloy Standards can be ground quickly in your own tool room, using an ordinary silicon carbide wheel for the rough grind, a diamond wheel only for sharpening. With a minimum stock of Standards on your shelves, you'll be able to get up to 80% of your single-point machining jobs rolling in a hurry.

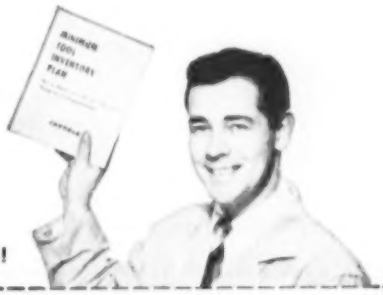
to reduce your single-point tool stocks . . . with Standard Carboloy Tools!"

3 **Here's why the Minimum Tool Inventory Plan (MTIP) will work for you.**

The Carboloy MTIP includes all the helps you'll need to standardize your single-point machining jobs with Carboloy Standard Tools. Send for the free MTIP kit. When it arrives: (1) Review your special single-point blueprints, using the handy plastic Instant Tool Selectors (above) to choose in seconds the right Carboloy Standard Tool to adapt for each job. (2) Enter the findings on the Plan Sheet (above, center), filling in the "...Tools Recommended" section. *That's all there is to it!* Now you can quickly compute what Standards you'll need, how many to stock, how much they'll cost. You'll see at a glance how the MTIP reduces your inventories up to one-third or more . . . lowers initial tool investment, shortens delivery cycles . . . gives you other benefits shopwide.

4 **A Carboloy Sales Representative or Distributor will make sure it works.**

Before you adopt this plan you can, if you wish, have a carbide expert from the Carboloy factory, district office or nearby Carboloy distributor come to your plant . . . help you get the MTIP rolling. He knows what carbide grades to recommend for particular jobs. He'll show you how Standard Carboloy Tools can pay for themselves in increased production and downtime savings alone. His services cost you nothing.



Carboloy Tools Are Stocked Coast To Coast By

AUTHORIZED CARBOLOY CEMENTED CARBIDE DISTRIBUTORS

Look under "Tools" in the Yellow Pages of your local telephone book, or in Thomas' Register, for your nearby Carboloy distributor. He has complete local stocks and can give you complete carbide service.

"Carboloy" is the registered trademark of the Carboloy Department of General Electric Company

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DEPARTMENT OF GENERAL ELECTRIC COMPANY

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☐ Please rush me, at no cost or obligation, full details on your Minimum Tool Inventory Plan.

☐ Have your representative call, without obligation.

Name _____ Position _____

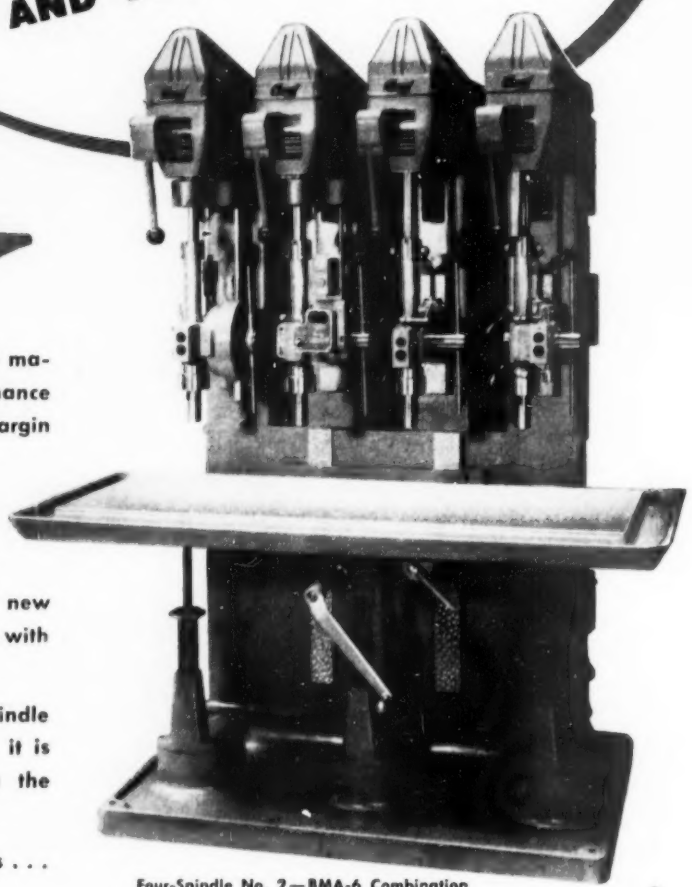
Company _____

Address _____

City _____ Zone ____ State _____

Try an AVEY once . . .

AND YOU'LL NEVER CHANGE



Four-Spindle No. 2—BMA-6 Combination Machine. Built in No. 2 and No. 3 sizes.

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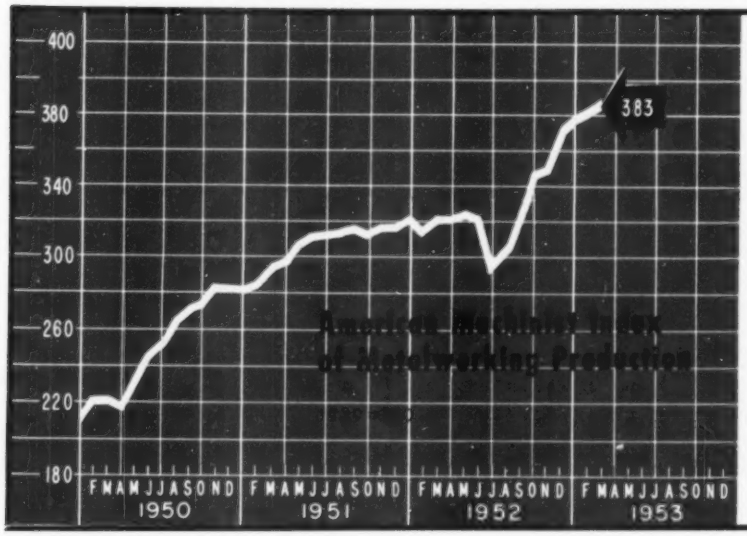
Avey DRILLING MACHINE CO.

CINCINNATI 1, OHIO

Gaging Metalworking



PRODUCTION INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	MAR '53(*)	FEB '53(p)	JAN '53(r)	FEB '52
	383	**381**	**377**	**319**
Machinery	343	342	322	
Electrical Machinery	431	429	367	
Autos	300	296	212	
Other Transportation	617	612	504	
Other Metalworking	380	375	314	

(*) Estimated (p) preliminary (r) revised

Metalworking production is expected to stay at the present boom rate through the second quarter.

What's more, prospects are growing that activities will continue at or close to the current level during much of the summer. The third quarter looks very good.

• • •

American Machinist's index is at 383 for March. That is up two points from the previous post-war high of 381 in February.

The big push in some Metalworking industries during the second quarter is likely to boost the index even higher.

• • •

Automobile manufacturers are aiming at almost 2 million units as their second-quarter goal. Assemblies in the first quarter were 1.5 million.

The fact that certain automobile companies have firm commitments for conversion steel in the third quarter is taken as proof that car assemblies this summer will still be very large.

• • •

Defense and defense-related production is second only to automobiles as a stimulant to Metalworking. Aircraft output is still rising and is far above the level of a year ago.

Airplane operations are about as high as they will go, however, unless new expansion programs are launched.

• • •

Retooling for appliance manufacture has put a bigger load on contract tool and die shops than in years. Most shops are busy in all important centers, but not as much rush work is coming through.

Appliance production is doing well in all lines, though some weakness has developed in demand for refrigerators.

Radio and TV sales are booming, despite the fact that the industry is nearing the season for a normal slackening in operations.

• • •

The steel people are pretty happy about the immediate outlook. Third-quarter bookings are good but mill schedules for that period are not yet filled in many steel items.

Sheet and strip steel continue hard to get, with consumer-goods makers doing their best to secure all available tonnages.

Steel warehouses still have only 65-70% of normal tonnages and only half the number of items that they like to stock.

• • •

Industrial machinery builders are at a postwar peak and should maintain present volume during the next few months or longer.

Construction machinery makers have heavy backlogs. Turbine, generator and motor manufacturers will be busy at capacity for many months. But new orders, in most cases, are not keeping pace with production.

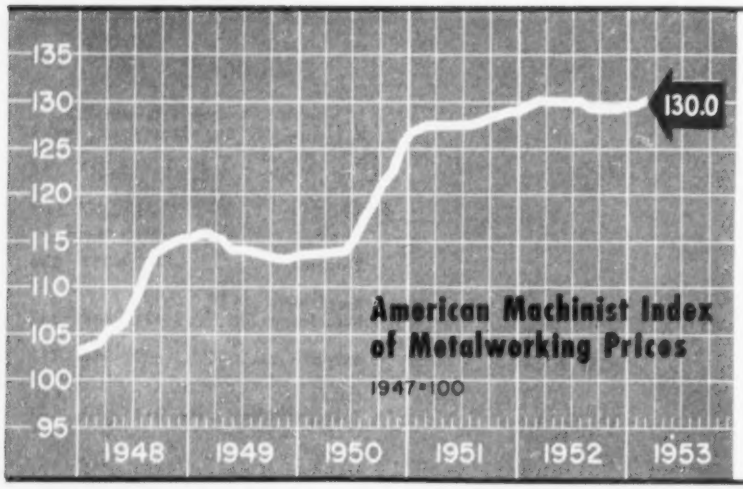
• • •

Gray iron castings business is not as active as it was. Piled-up orders, on the average, provide about two-months' work. Some shops, though, are down to a two-weeks' backlog.

• • •

Manpower remains very tight, but not critical except in relatively few spots. In one key city, two metalworking companies have been able to hire machine operators for night shifts for the first time in months. Skilled men still are scarce, however.

Gaging Business



PRICE INDEX

	MAR '53(*)	FEB '52(p)	JAN '52(r)	FEB '52
Total Index	**130.0**	**129.8**	**129.7**	**130.0**
Metalworking Machinery	**137.8**	**137.8**	**136.8**	
Other Machinery exc. Electrical	**132.5**	**132.4**	**132.9**	
Electrical Machinery	**124.6**	**124.5**	**126.6**	
Fabricated Metal Products	**128.3**	**128.3**	**128.3**	

(*) Estimated (p) preliminary (r) revised

Nation's economy is at peak levels. Gross national product is running at an annual rate of $366 billion. Capital and government expenditures continue high. Consumers are consuming more than ever.

Government spending is being cut and capital spending may slack off. For a time, the slack may be taken up by more consumer buying.

• • •

Industrial prices are moving up. Increases have been announced for copper, some steel products, building materials and chemicals.

• • •

Federal Reserve Board Index for March is 241 (1935-1939 = 100). Some 15 points of the total represents durable goods production for inventory—only 6% of total industrial output. But it is about 13% of the durable goods output. The total index has gained about 15 points in the last six months.

March steel output was record-breaking. Steel mills turned out almost 10 million ingot tons.

• • •

Freight car builders' backlogs continue to shrink. At February's end they totalled slightly under 72,000 cars, compared with last year's 119,000. Output in February was 7,780 units—slightly higher than a year ago.

• • •

February retail sales ran almost 7% over retail sales for the corresponding period in 1952.

• • •

February employment was up about 400,000 over the January level—1.2 million more than February of last year's total.

Non-agricultural employment rose almost 500,000 between January and February, making the February total of 55.6 million non-agricultural employees the highest on record. Total US unemployment dropped from 3.4% in February, 1952, to 2.9% in February, 1953.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1923-25 = 100)*	260.8	258.6	239.1
Steel ingot production (thousand tons)	2,259	2,288	2,131
Electric power output (million Kilowatt hours)	8,075	8,078	7,263
Production of automobiles and trucks	169,123	165,762	125,347
Engineering construction awards (*Eng. News-Record*, millions)	$344.1	$316.1	$271.6

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Refrigerators sales (thousands of units)	347	268	275
Vacuum cleaners sales (thousands of units)	256	249	230
Washers sales (thousands of units)	277	311	214
Household electric ranges sales (thousands of units)	109	87	81
Radio production (thousands of units)	1,093	1,325	632
Television production (thousands of units)	719	921	405
Gear sales index (1935-1939 = 100)	688.9	590.8	539.5
Foundry equipment new orders index (shipments, 1937-1939 = 100)	257.3	301.0	200.4

* Seasonally adjusted

Case of the Nine Drifting Slots

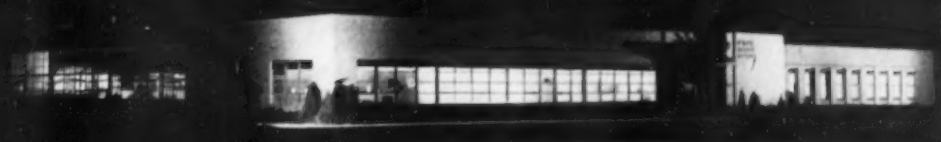
At Detroit Broach a baffling case came up recently—but it was solved in an ingenious manner.

A manufacturer found he was having considerable trouble holding close spacing tolerances on nine precision slots in the O.D. of a ring. When one slot at a time was made, the slot closed in afterward, leaving the slot undersized. This close-in made it difficult to hold spacing tolerances between the nine slots.

Detroit Broach was called in on the case, and after study, recommended that all nine slots of the nut be broached at one time. This was done on a vertical pull-down broaching machine. In contrast to common practice the work travels and the broaches are stationary in a special holder. In this manner the work is pulled through the broach holder and all nine slots are produced in one pass. Guides are incorporated in the set-up to prevent the work from drifting during the cutting operation.

This is just typical of the solutions made every day at Detroit Broach. If you have a special broaching problem, or if you would like further information on the cost saving advantages of broaching, it will pay you to contact Detroit Broach.

WORLD'S LARGEST MANUFACTURER OF BROACHES AND BROACHING TOOLS EXCLUSIVELY



DETROIT BROACH COMPANY

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SHEFFIELD
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SNAP GAGES
NEW PRICES
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The magnitude of current defense procurement pyramided on unprecedented civilian needs has made it practicable for Sheffield to more than triple its manufacturing facilities for standard A.G.D. gages . . . and to put them on a mass production basis.
Mass production methods have reduced manufacturing costs as they normally do. Mass production coordination has made it possible to build up complete stocks of standard gages and maintain these stocks at full quota.
Sheffield's policy is to pass its manufacturing savings on to you in reduced gage prices. Thus you can now have Sheffield Quality at a low price and without waiting.
See your representative or write us. Your quotation will go forward as soon as we know your requirements. Get them in the mail today.
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American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Special Kind of Inventory

Inventories are the topic for much talk these days. The question is: How much raw material, work in process and finished products do most manufacturers have on hand? It is important just now to guard against excessive inventories.

For two or three minutes here, we want to tell you about a different kind of inventory. You may not have it up-to-date in your shop. Yet its condition and what you intend to do to improve it may easily bring health or sickness to your business.

This inventory is of the production equipment in your plant—its age, how much of it is in certain types and sizes of machines, how modern it is to do your manufacturing job efficiently and at relatively low cost.

How does it measure up against the machines installed elsewhere in your industry? Are you ahead of or behind the parade? Are you losing or gaining ground? How does your equipment stack up against that in American industry as a whole?

AMERICAN MACHINIST editors expect to be able to supply data or intelligent answers to these questions next November. At that time the seventh AMERICAN MACHINIST Inventory of Metalworking Equipment will be published.

The most recent inventory was taken in 1949 prior to Korea and is outdated. Since then, the defense program has been responsible for an expansion of machine-tool production on a scale second only to that in World War II.

Machine-tool users have had to put aside their replacement requirements while defense needs were filled. Only customers with rated orders could get deliveries.

Recently controls have been relaxed, as the defense program progressed. Once again, modernization to lower costs can be a main objective in purchasing new production equipment.

The new McGraw-Hill survey of business' plans for new plant and equipment reveals that last year, as defense tooling pressure eased, slightly more than one-half of the money invested in new machinery went for replacements. This year the ratio will be still higher, an estimated 57%.

The trend toward spending for modernization rather than expansion of facilities will be even more pronounced the next three years, 1954-1956. More than four out of every six dollars will be invested in new machines that will replace the old and do a much better and less costly job.

IT IS A GOOD time to take a searching look at your own equipment and see how many individual machines or processes are antiquated or at least inefficient by today's standards.

You can do this with a minimum of effort. Within the next few weeks you will receive by mail a questionnaire to be filled in and returned to us as your part in the new AMERICAN MACHINIST Inventory. It will ask you to give us your figures on numbers, sizes and types of production machines and their ages in your shop.

At the same time that you complete the questionnaire and mail it to us, be sure to keep a copy for your own guidance. It will enable you to decide what equipment should be replaced after you compare your own inventory with the over-all inventory figures in our Mid-November 1953 Issue.

Burnham Finney

CINCINNATI Shears at CONVAIR

Photos Courtesy Consolidated Vultee Aircraft Corp., Fort Worth, Texas

This 3/16" x 18' Cincinnati All-Steel Shear, one of the Cincinnati units at Convair, has the length to cut full length standard sized sheets.

Cincinnati All-Steel Shears at Consolidated Vultee Corporation are shearing sheets straight and true in the important production of the world's largest bombers.

Illustration shows a 3/16" by 18' Cincinnati Shear, one of the Cincinnati units at Convair. Aircraft production requires unusual length as well as unusual accuracy in shearing. Cincinnati furnishes shears to the aircraft industry in lengths up to and including 24' of length in 1/4" thickness.

Cincinnati All-Steel Shears will give you accurate performance. Write for Shear Catalog S-6.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

how Sylvania fashions fluorescent fixtures

PRESSWORK . . .
PAINTING . . .
ASSEMBLY . . .

BY E J TANGERMAN, EXECUTIVE EDITOR
AND CHARLES EMERSON, ASSOCIATE EDITOR

For the first time anywhere, methods of making fluorescent lighting fixtures are described here, based on an editorial survey at the Wheeling, W Va, plant of Sylvania Electric Products Inc, largest maker of such fixtures. At this plant, as many as 200 fixture types are in production in a given month, of a total of over 600 types manufactured. Daily output runs as high as 4000 fixtures, yet blanking lead time over assembly is only seven days, painting lead time four or five hours. This demands careful production control, particularly because of wide variations in quantity between types.

Three major departments here have been typified in our picture-and-caption selections. They provide ideas in metal fabrication, painting, and assembly, chosen both for newness and for broad applicability. Only the greatest cooperation from plant personnel has made this possible.

Photographs were taken especially for this report by Jim Burns.

American Machinist SPECIAL REPORT NO. 333 TO THE METALWORKING INDUSTRIES

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MID is the watchdog

Incoming materials and components must be controlled regardless of whether they are processed or only assembled. Elements from other Sylvania plants are assumed acceptable because other plants have identical inspection requirements, but everything from outside suppliers is checked either by sampling each batch or by 100% inspection. This is done in the Materials Inspection Dept. MID maintains a card-file history of each supplier showing faults of earlier shipments. Thus, MID men, in addition to regular checks, look particularly for previously discovered weaknesses. Ok'd materials and components are so stamped, then go to Materials Receiving Dept (MRD) from which they are drawn for production.

A one-week supply is maintained in MRD, all charted for quick location, and most of it palletized for ease of handling by fork truck.

Sheet steel, for example, if it is to be handled as blanks, is cut to blank size, then palletized and moved by fork truck to the presses. Four shears, two 72, one 120, and one 144 in., are operated by men on incentive. Their group leader supervises and assists in setup for a new job, then the setup is checked by an inspector before the job is released for shearing. Further, the inspector checks each shear hourly to see that dimensions are being maintained. Inspectors also check every other production machine in the plant hourly to see that tolerances are maintained, as well as each setup before a run starts. Operators are not responsible for providing stock or for removing fabricated parts or scrap. These operations are performed by stock handlers. Most stock is 18 to 20 gage, and operators commonly use rubber suction cups in handling. There are the type with a ring over the cup, so the operator may wear one over his glove on his little finger or, in the case of quick-acting presses, may have it on the end of a 1-ft length of broomstick for safety.

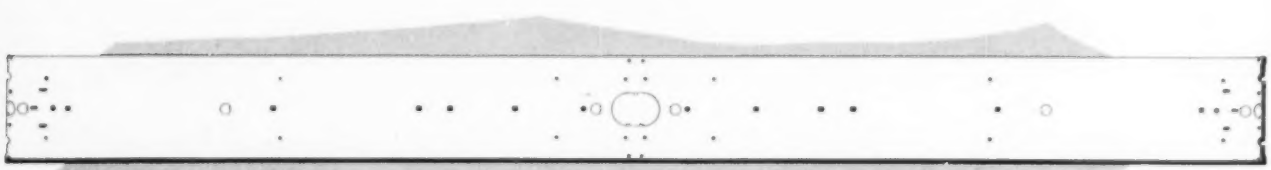
About 600 dies are in regular use, and maintained in a well-equipped toolroom. Some dies must be redressed after only a few thousand impressions to avoid burrs or galling; others can be used for many times that number. Usual die tolerances are 0.0005 in. on critical dimensions.

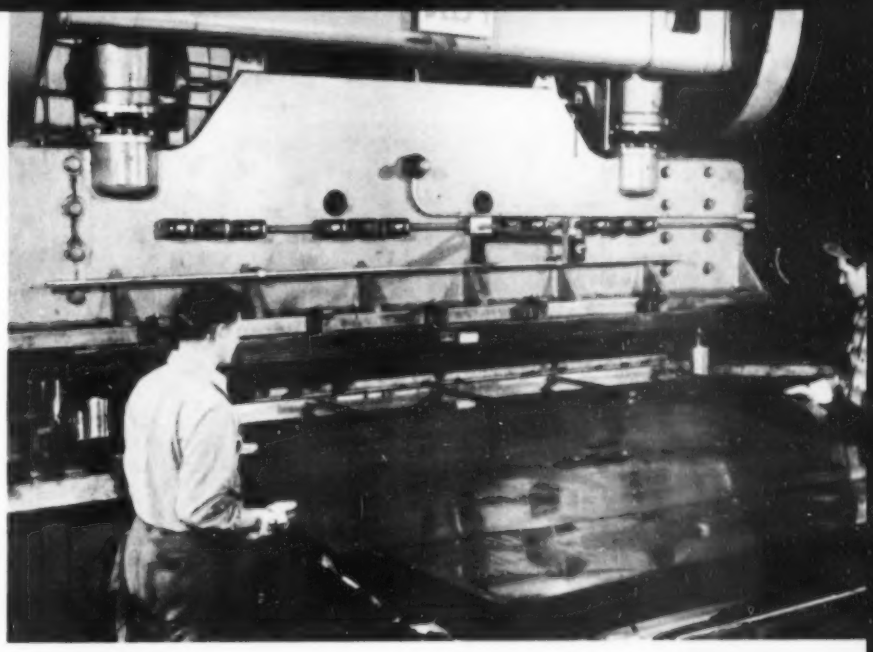
There are 35 basic types of commercial lighting units in Sylvania's Trimline series, but all reflecting chassis are blanked, pierced, and formed in two sets of three-part dies. Some of the differences in end products are in the louver assemblies, bottom panels, end plates, plastic or metal side panels, and decorative end-cap accessories; but the two die sets do all the chassis work, regardless of the size of the fixture; 2, 4, 6, or 8 ft. long.

Each die set consists of two end dies and a center die, separated by spacer bars of various dimensions to produce the full length of chassis required in each case. One set takes care of 2- and 4-ft length of the standard-start (using starter and ballast) units. For the short chassis, only the end dies are installed in the press. For the 4-ft unit, the center die, which makes the mounting knockouts and ballast-mounting holes, is inserted between the end dies.

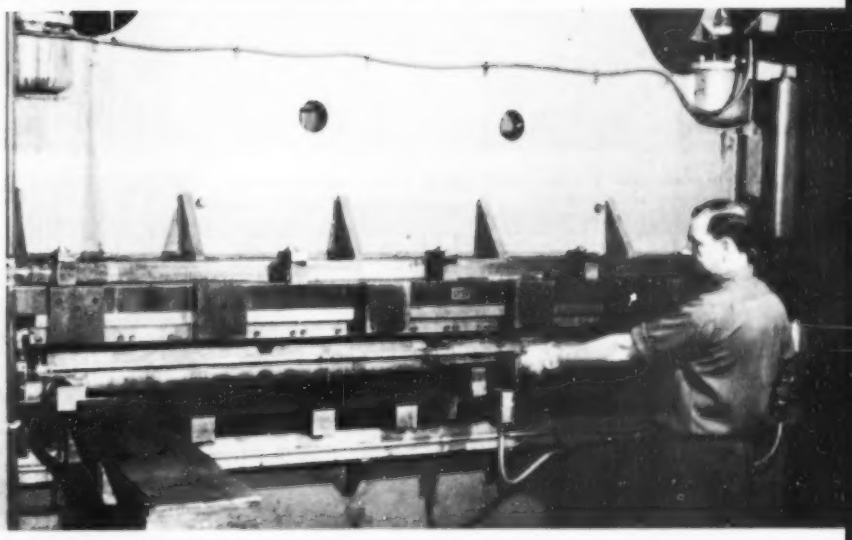
The second set of dies handles chassis for 4-ft, 6-ft, and 8-ft instant-start fixtures. The center die is the same as in the standard-start fixture dies, but end dies are different. Only difference in press setup for the three sizes is in the spacer bars between die sections.

Several center-die punches are retractable, and may be replaced by others to shift the location of ballast-mounting holes. The 4-ft instant-start chassis are formed two at a time in a die 8 ft long, which evens wear on the die. A single forming die does all this work.

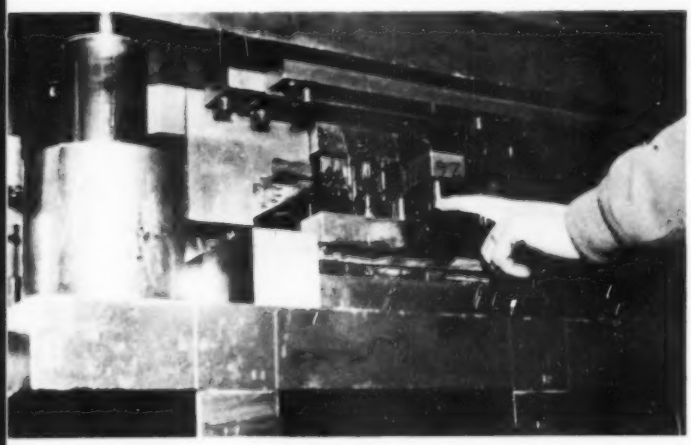


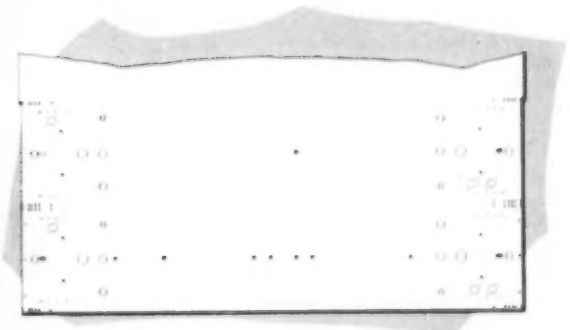


PROGRESSIVE THROUGH-FEEDING DIE on 225-ton Verson press punches, blanks, and trims 8-ft chassis bases for industrial fluorescent fixtures at 125 per hour. Stock is 20 gage, 42 by 101 in. when fed, which is enough for four pieces. Two operators load stock, a third works at back (next picture) to gage and to handle finished pieces, then place both hands on safety buttons to activate press clutch. Die set has plate stripper; is three dies actually, a center one and two end ones. End dies can be moved in and center section changed for 4-ft fixture

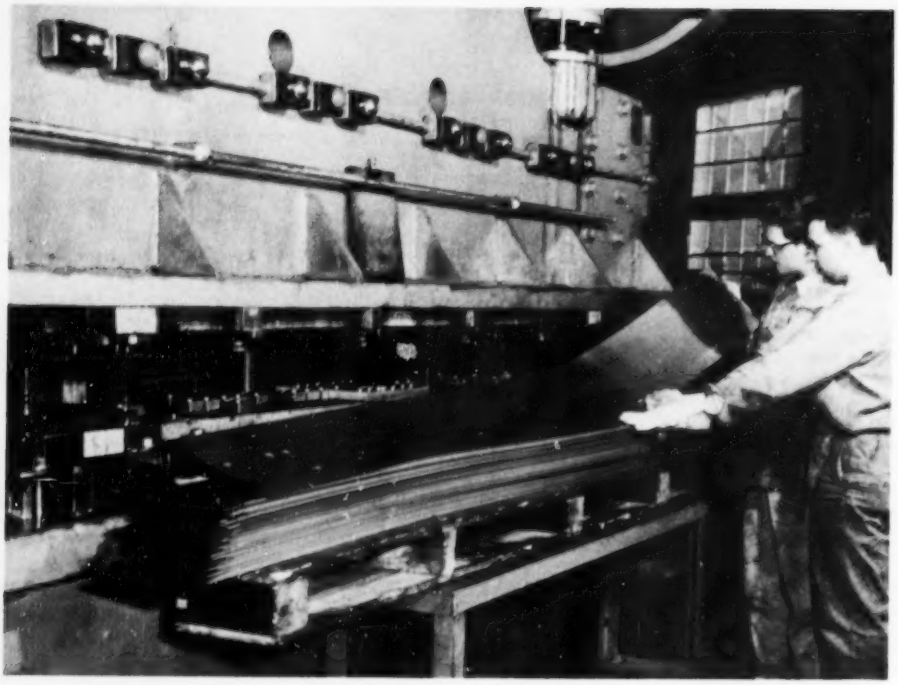


STOCK COMES OUT OF THREE-STAGE DIE punched, with knockouts formed, and trimmed. Final cutoff is made at third stage. Operator at rear of press pulls blank back to three fixed stops and interlock switches (vertical lever at left hand) which close complete press circuit, flashing green light on front of press. Scrap falls to tote pans on floor

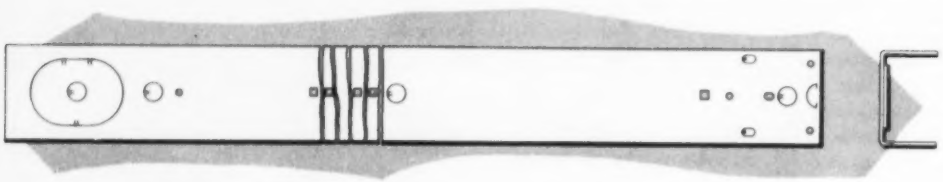


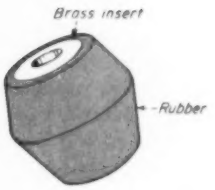


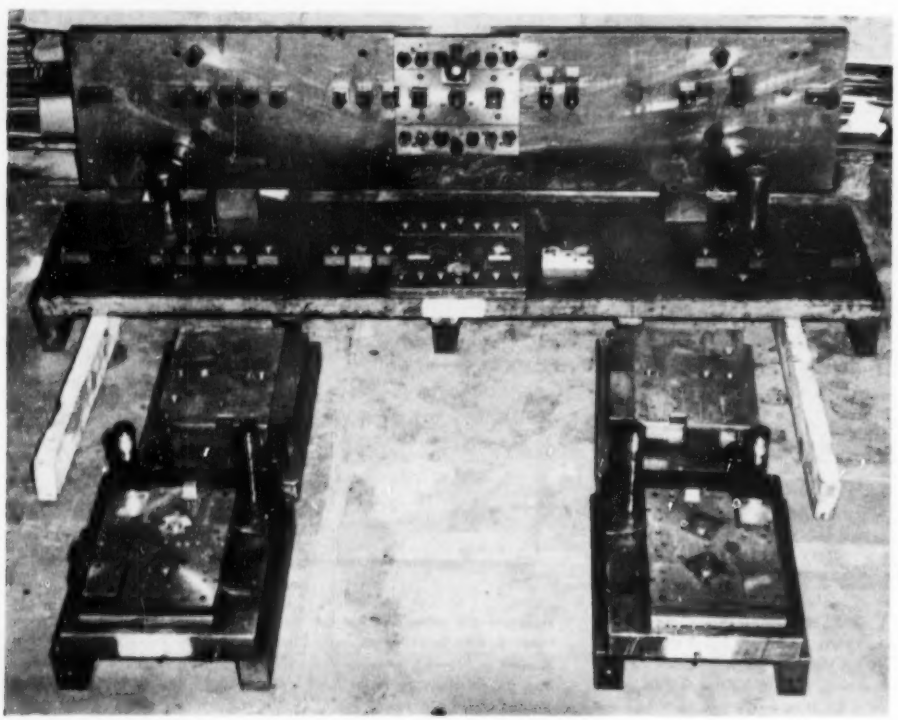
THREE-STAGE (SECOND IDLE) CHASSIE DIE is basis for fixture-standardization program now in progress. There are about 98 punches, including 11 square, 17 knockout, and several oval shapes, plus side trimmers, all operating on first stroke. Second stroke is idle, third shearing to width. Final stock size is 10 9/16 by 98 7/8 in. When end elements are moved in for 4-ft fixtures, two men can run press, one loading, one catching at rear. Dies are held by machine screws and located by dowels on a bolster plate, which in turn is set above press bed on parallels to permit removal of punchings. The die complete weighs about 6½ tons



SECOND DIE TYPE IS SINGLE-STAGE, like this one. It is also a 3-part built-up unit, punching pre-trimmed chassis blanks on another 225-ton Verson. Job here is a simple one- or two-man loading and unloading operation. One press stroke completes piercing, which includes cutting holes in industrial-reflector chassis for ballast-can assembly, wiring, and support brackets. Strippers are rubber "barrels" with brass washers on ends. They fit individually over punches

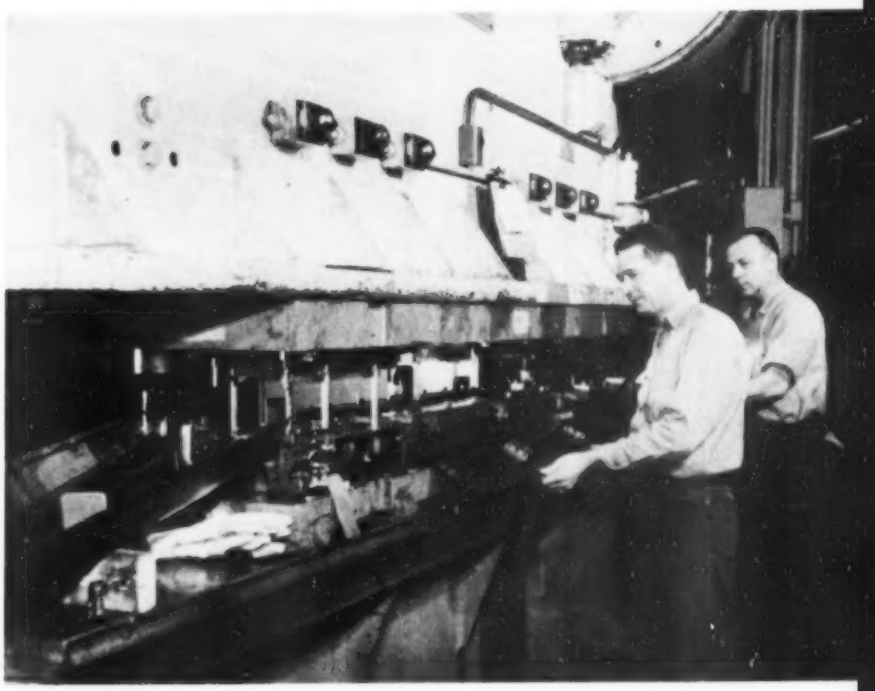


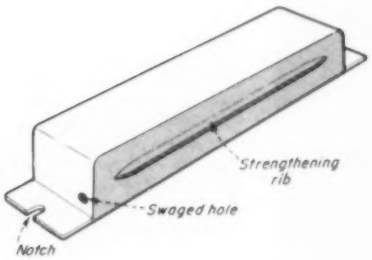


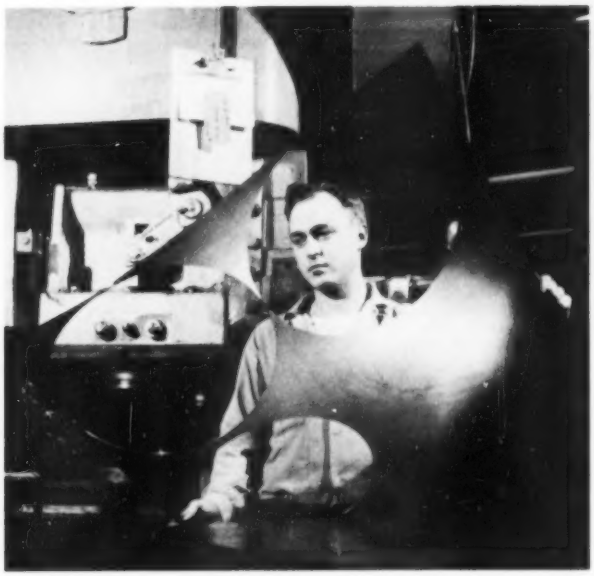


ENDS AND MIDDLE OF DIE-SET ARE SEPARATE, allowing length adjustment for eight different reflectors from 2 to 11 ft long. Set includes 11 knockouts, 12 square holes, 2 notches in each end, 28 ⅛-in. holes, 6 oval holes, and 6 3/16-in. holes for 8-ft reflector, which is 20-gage stock, 10⅛ in. wide

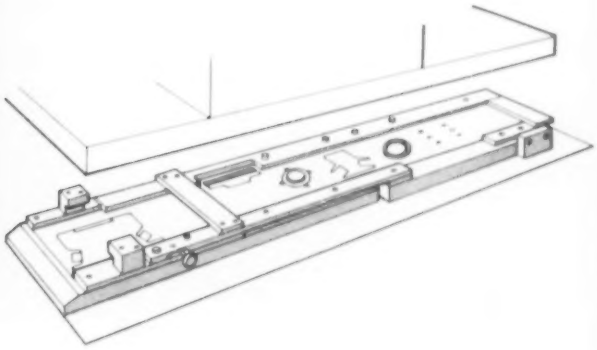
THIRD TYPE OF BUILTUP DIE is this four-stage right-to-left progressive that makes ballast cans. These are filled in another plant, returned for assembly. Operations are piercing, bending tabs at both ends of can, embossing company imprint and swaging holes for wires (actually rolling rim to eliminate burr that would cut insulation), and bending to form the can shape. Last operation is done with upper die coming down around punch to form stock. Steel is fed from a table at right, and may be either strips or coil. Press is 225-ton Steelweld, stock is 0.0516 in., rate 198 pieces per hr

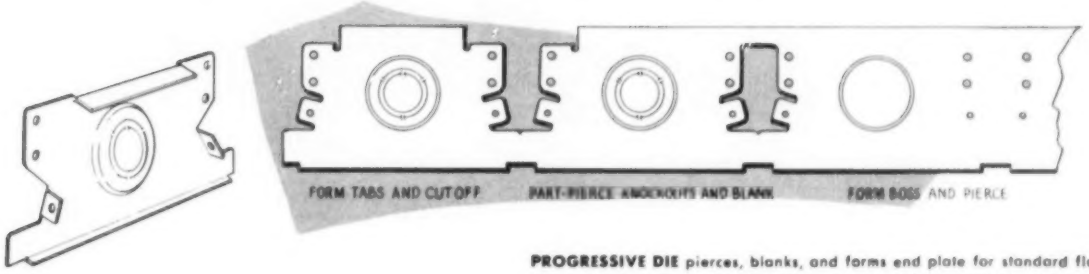




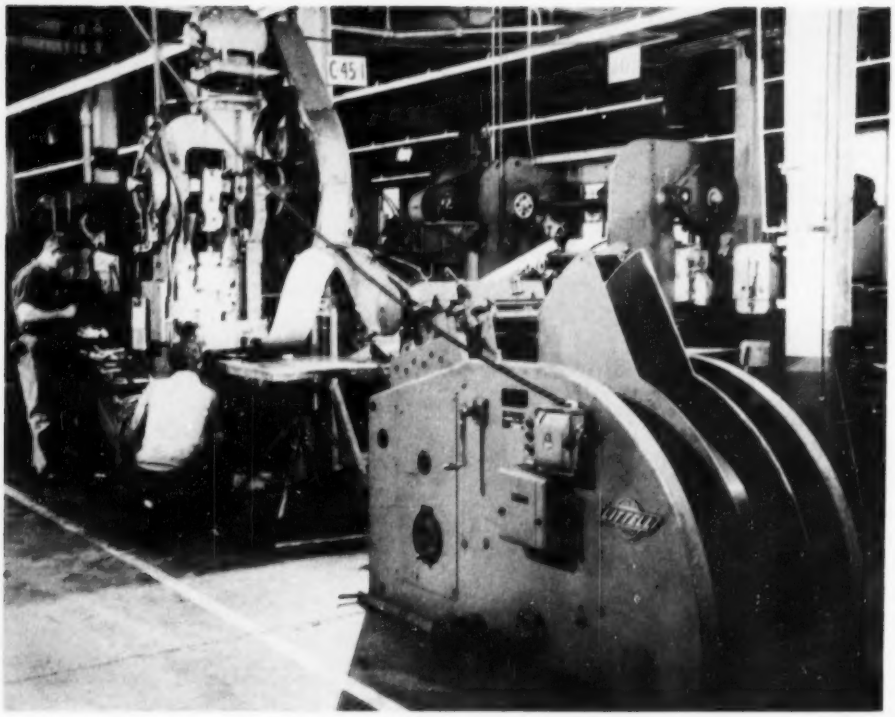


SOME PRESSES HAVE SPARE TIME, which is used where possible on outside work. Here, for example, cap blanks for automobile air cleaners are cut from large pieces of scrap for a Detroit company. Idea takes simple die, improves machine utilization, and economizes on 20-gage stock that is not usually delivered to size, reduces cost to Detroit purchaser, produces scrap near mills. Usual scrap from trimming shears allows four blanks each

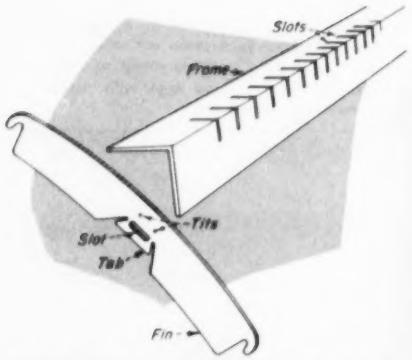




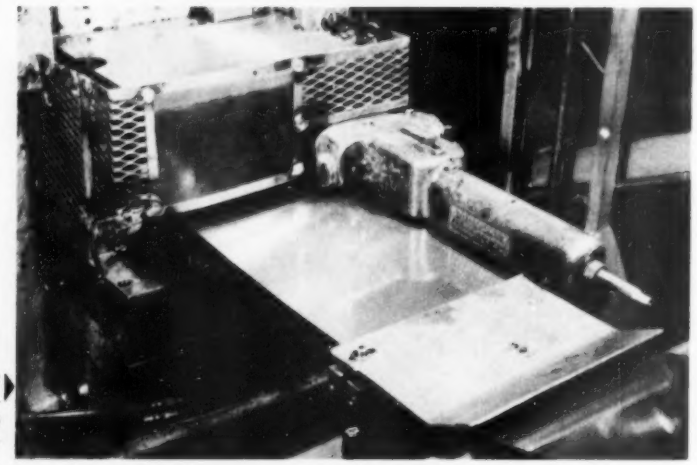
PROGRESSIVE DIE pierces, blanks, and forms end plate for standard fluorescent fixture. Two sizes of knockout are part-pierced, one within the other, on a center boss. Last die stage bends tabs by which plate is assembled to chassis

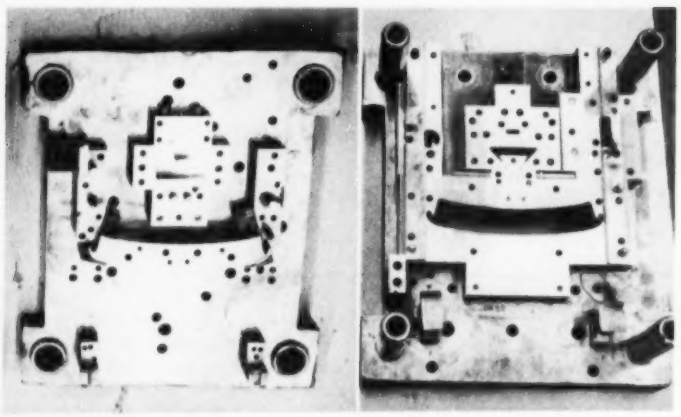


COMPLETE AUTOMATIC HANDLING at Bliss 60-ton press that pierces and blanks louver fins complete starts with Littell continuous coil-straightening machine. Stock feeds through rollers to take-up hump under arm from feed mechanism. Arm controls switch on feeder; when stock backs up, arm raises and cuts off feeder, and vice versa. End of arm (out of sight behind stock) carries oil-soaked cloth that lubricates stock to prevent binding in die. Die table under stock hump prevents strip from buckling under if it gets taut



STOCK IS INDEXED WITH PRESS STROKE by Dickerman Rol-Di-Feed, which uses pressure rolls on edge of stock. Takeup from stock hump is automatic and continuous while press runs; whereas Littell feed to hump is automatic, but not continuous

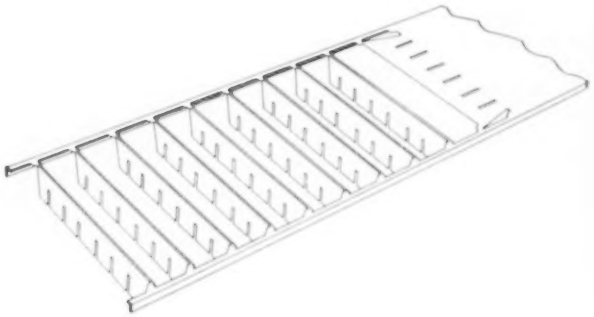


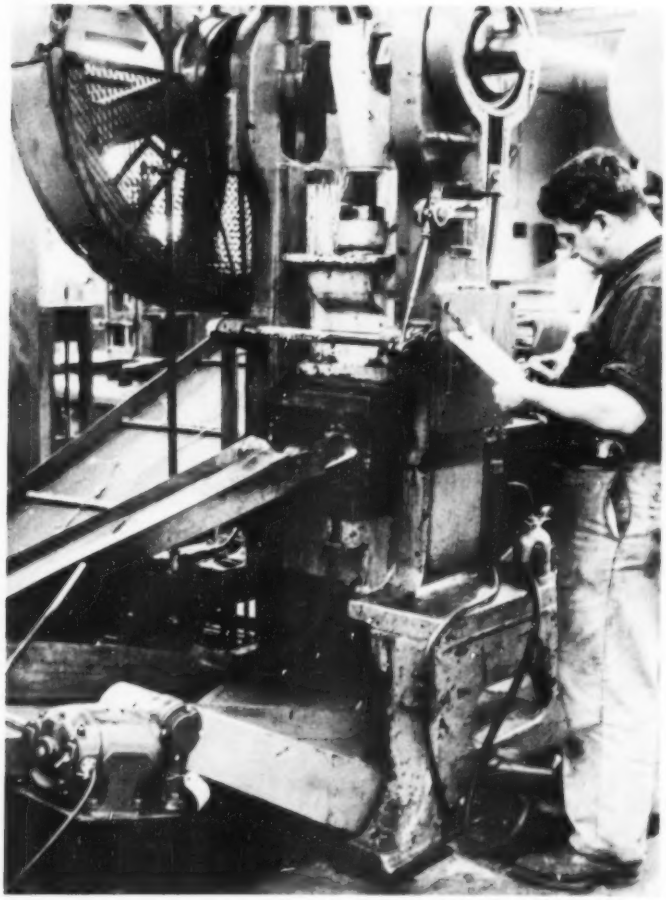


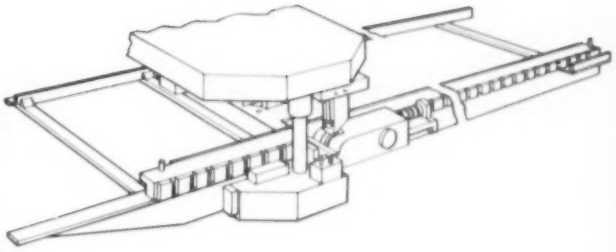
TWO-STAGE DIE FOR LOUVER FINS blanks, cuts center tab and weakening hole (a rounded slot), and indents locking tits that hold it into louver-frame slot. Fins drop through die, while scrap is carried on through press

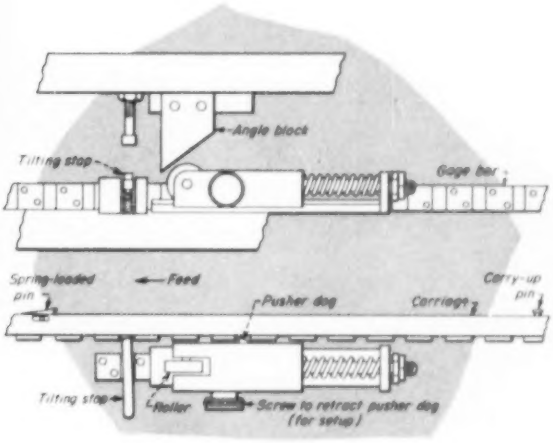
SCRAP DISPOSAL IS DOWN UPPER CHUTE to May-Fran portable conveyor that carries it to tote box behind press. Lower chute carries complete fins to another portable conveyor, hence to another tote box. Littell feed is also movable, so actually all "automation" is portable, can be used with various presses

ONE TYPE OF "EGG-CRATE" FIXTURE LOUVER is made from flat stock formed into a wide-web channel. A two-stage die blanks triangles out at each edge, then shears fin along one edge only and bends it down. Interlocking feed for Warco 60-ton press operates from a cam bar to provide accurate indexing on transverse louvers. Original method with regular stock feed ran out far too much on total length of louver (cumulative error); this system holds length within 1/8 in. on complete louver and has boosted production rate 150%. Stock is started by hand, but operates after that at highest speed press will take

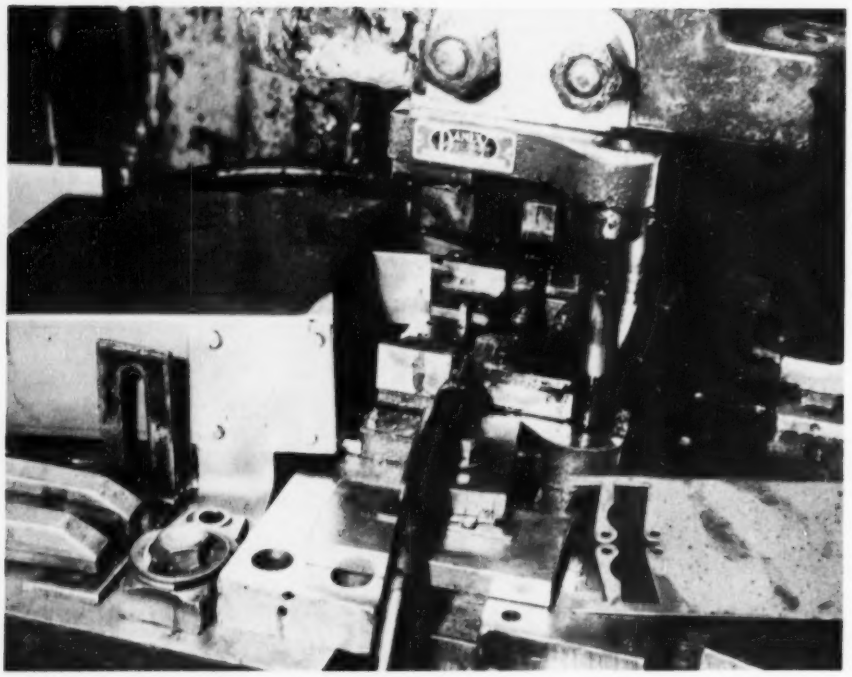




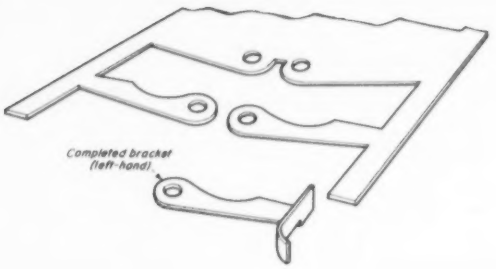


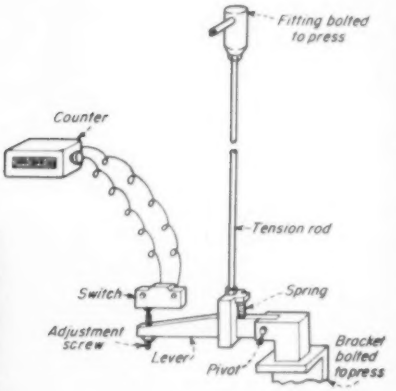


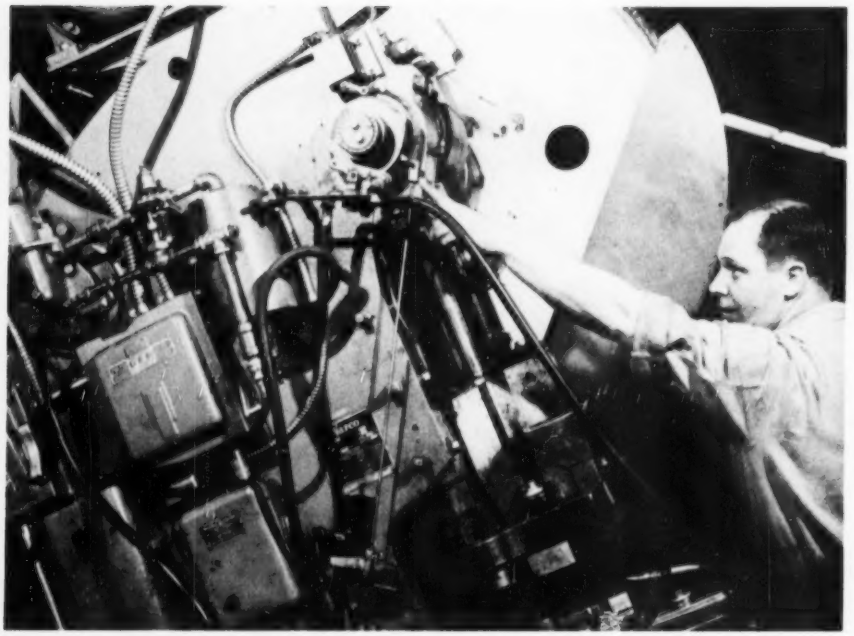
CAM BAR MAKES INDEXING POSTIVE THIS WAY: Ram drops, and tapered wedge block on ram forces indexing block to right (bearing surface is a roller). Block carries spring-loaded latch that drops into cam-bar slot, then spring returns block, carrying stock with it, to operating position just after previous louver fin has been formed



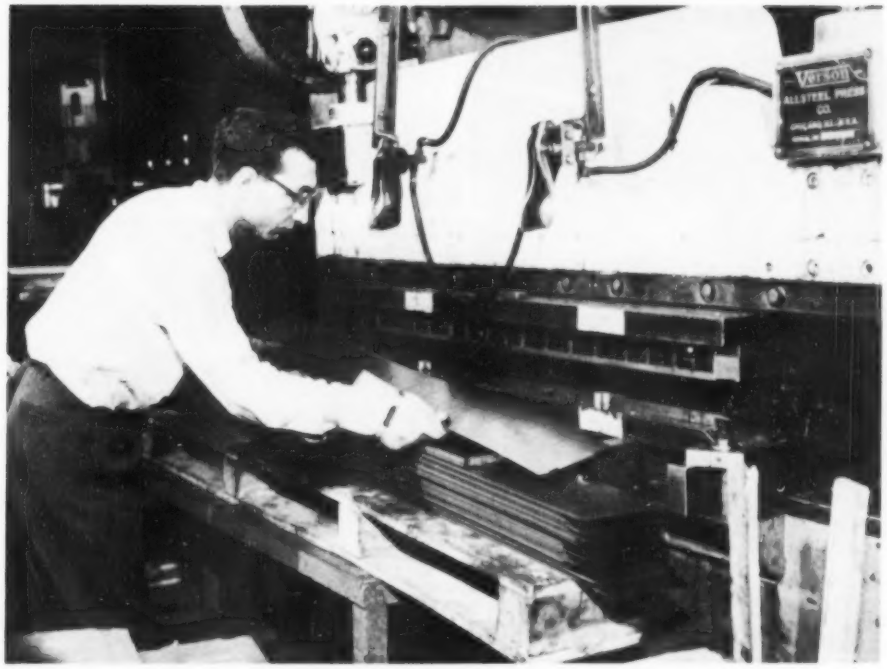
LATCHES THAT LOCK LOUVER TO FIXTURE CHASSIS (and allow disassembly for cleaning and lamp replacement) are blanked two at a time, one left-hand, one right-hand, in single die. Stock is double width required; mating latches are blanked in first stage, then bent and trimmed (sketch) in second as mirror duplicates of each other. Chutes keep left- and right-hand units separated



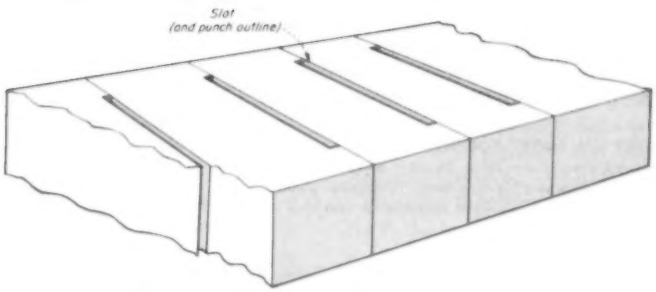


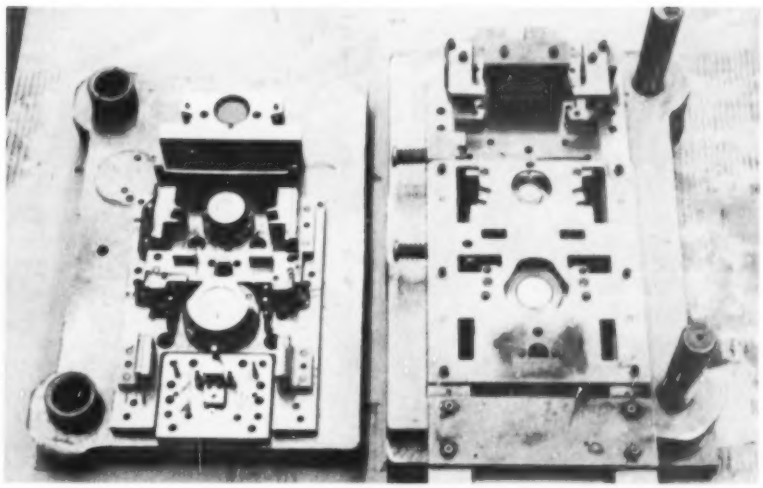


POSITIVE PRESS COUNTER works on multi-stage dies, giving accurate count of total pieces produced, regardless of number of press strokes required to start strip or idling strokes between. The rod is spanned across C-frame of press, with top end anchored and bottom end attached to lever that is pivoted on anchored axis. Lever has 4-to-1 mechanical advantage, with end operating precision switch that trips counter. Adjustment on end of lever allows setting mechanism so switch will be tripped only when press "swells" under full die load, which might be for three die stages. Under full load, press pulls tie rod, which moves lever, trips switch, and actuates counter. Lever is spring-loaded to eliminate lost motion

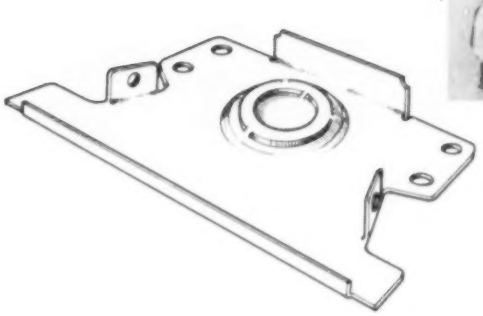


SECTIONAL DIE THAT SLITS AND BLANKS louver frames into which fins are later assembled operates in 45-ton Verson press. Two models are made; one with 14 slots is inserted once, but other with 29 slots is hit once, then reversed for a second set of slots. Location of end stops positions strip stock so second set of slits are midway between first set. Die is built up from HSS blocks, 2⅝ wide by 3/64 in. thick. Each die block is ground rectangular, then clearance slot for punch is ground into one edge. Long edge of next block completes slot outline. Full die has 14 slot blocks plus two end blocks





THREE-STAGE DIE FOR FIXTURE END PLATES punches 13 holes, forms knockout in two stages, and does cut-off and bending. Strip stock is fed by channel plates attached to lower die (right). Truncated shape of larger knockout punch and stripper is simply to improve stripping the punches



TILTING DUMP-TOTE BOXES save an estimated $3000 annually in materials-handling costs. Box is located next to press, where scrap is dropped into it. Fork truck picks it up when full, moves it to auto trucks provided by scrap dealer at loading platform. Box has lock at rear, which is released by truck operator. Teeth on lower frame mesh with holes in curved bottom plate to prevent jumping. Balance is such that box drops back when empty, allowing lock to be thrown

DELTA DRILLHEAD IS MOUNTED ON SHORT COLUMN welded to 4 by 8-in. plate that is C-clamped to adjustable die-transfer table. Result is movable drillpress for short drilling or tapping jobs anywhere in the shop. Die-table elevating mechanism allows operation to be adjusted to height of press or machine with which it is used

HEAVY PRESSES IN STAMPING ROOM are aligned at about 30° to center aisle, which permits easy access to back sides (when through-feeding, for scrap pickup, and for maintenance), better light at front, more versatility in regard to floor space, and easier access for fork trucks, both to back and front of presses

PAINT LINE
is big and efficient

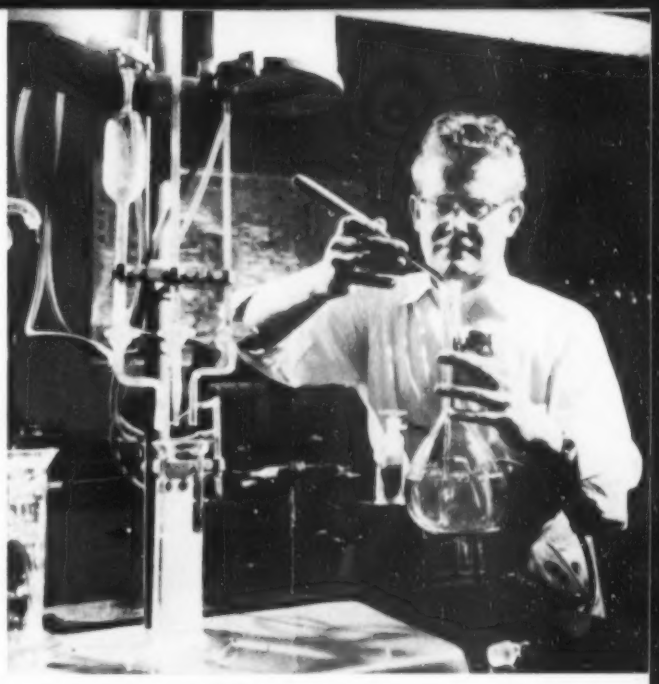
Painting is at once a simple and a complex job. Only three "colors"—white, gray, and aluminum—are applied, so production quantities for a given color and mix can readily be built up. But color, reflectivity, constant film thickness, freedom from surface defects of any sort, and resistance to fading, discoloration, and damage all demand close control, careful inspection, and frequent tests. Unless standards are maintained on all these specifications, the fixture will not have proper lighting efficiency or service life.

The cleaning and painting line is the most mechanized in the plant. A 1250-ft overhead conveyor with 625 special triangular carriers called "clevises" and four types of removable hangers is loaded on the first floor, carries parts to the second through cleaning, drying, painting, and baking; then delivers them ready for assembly. Lead time over assembly is frequently as little as four hours, yet clevis loads are balanced for uniform spray time so conveyor speed can be held constant. A feature of the conveyor system is elaborate automatic fire doors into and out of the painting area.

Parts first enter a 5-stage washer. In the first stage (1 min), they are cleaned with Parko alkaline solution (1200 to 1600 gal. in system) by means of two opposed but synchronized 6-ft spray wheels. The second stage is a rinse, the third a Bonderite 160 bath, the fourth a water rinse from pipe sprays, the fifth a Parkoline (chromic and phosporic-acid solution) dip to neutralize the Bonderite. Solutions are held within close tolerances by hourly titration checks, because fluctuation will quickly cause variation in finish. The Bonderite-160 process converts the metal surfaces to rust-inhibiting non-metallic phosphate coatings which also provide greater paint adhesion. The final preparation step is drying at 370 F.

Painting is done in one coat, usually 1½ mils thick, with the work remaining on the conveyor and moving at as high as 16 fpm. The conveyor goes through two of four spray booths, each containing a waterfall curtain for catching overspray, and each with its own filter system so clean and warmed air (under thermostatic control) can be provided at a rate slightly higher than that at which exhaust fans and the water curtain remove it. Thus each spray booth is under a slight positive air pressure, forming an air lock at the conveyor entry and exit points to avoid entrance of dust or cold air. The filter system also makes it possible for painters to work without masks.

Painters are trained to know how many passes are required for a coat of desired thickness and what paints are used on each part. A change of run is indicated by five successive empty clevises (about 10 ft of conveyor), giving the painter a bit under a minute in which to change platforms, guns, or make other adjustments. Each painter does only one part of the piece. Painters in adjacent booths face in opposite directions so both major faces of each part can be reached without rotating it. Paint is heated to 150 F under thermostatic control.



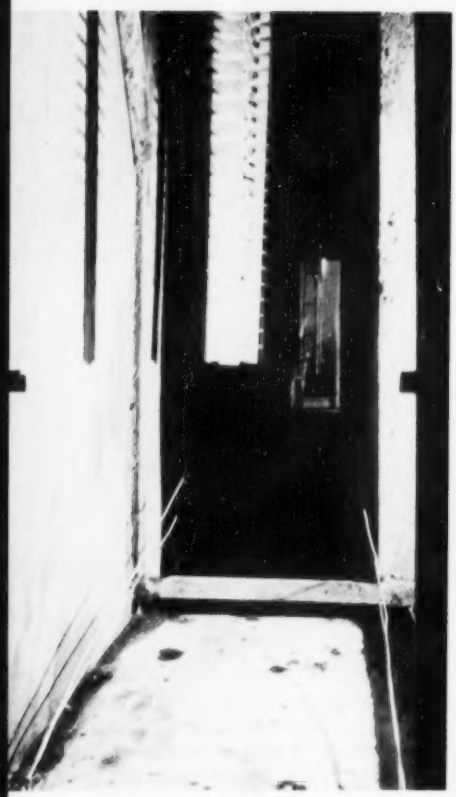
CHEMICAL PAINT ANALYSIS in plant laboratory maintains quality of reclaimed pigment in new solution

The 500 gal. of paint used each day are mixed in 150-gal. batches in a special room in which 12 air changes per hour prevent buildup of dangerous vapors. Viscosity and temperature of each paint batch are checked hourly, because film thickness is controlled by viscosity and nozzle shape in addition to painting technique. Paint in supply tanks is checked every morning before the run starts, and each batch of paint mixed is checked for color and finish.

Parts go last through a 168-ft baking oven at about 315 F, the heat being regulated to match conveyor speed and size of objects painted.

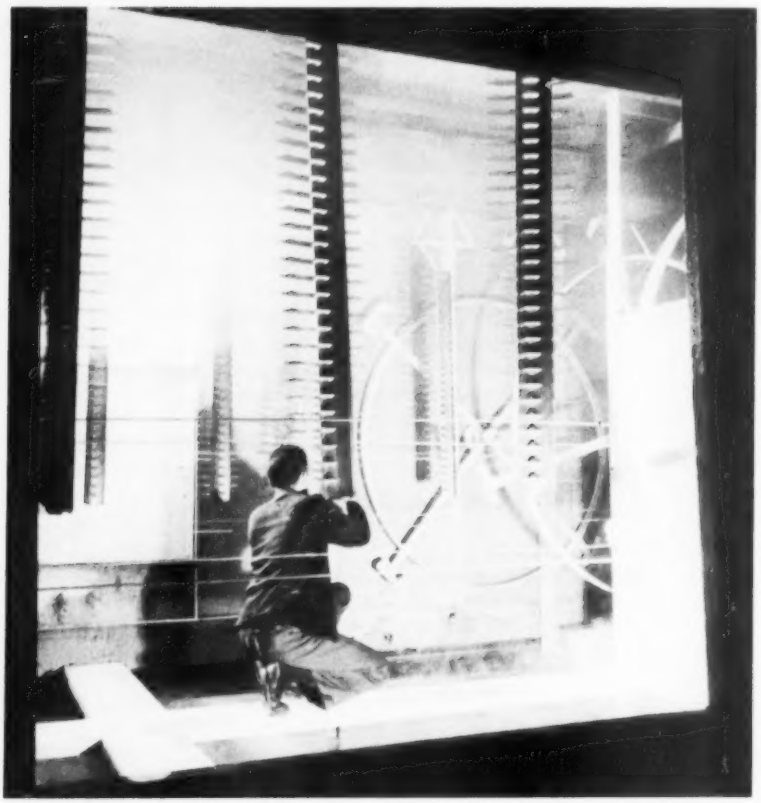
Inspection is exceedingly thorough. It includes checking every part for dirt, runs, "blueness" (too thin a coat, particularly on white) by comparison panel, metal defects, conveyor damage, water damage, and the like. In addition, typical parts and panels are tested on the Weatherometer for adhesion, cohesion, and film hardness. Alternating "sun", spray, and other effects are created in this unit for periods up to 1000 hr—the equivalent of five years of service life. Some white panels are also heated in an oven afterward to check the degree of yellowing. Film thickness is also checked on the Elcometer. Three film thicknesses are used: 1, dust coat (inside the chassis, for example), 2, finish coat (the top of the chassis, for example), and 3, reflector coat (on reflecting surfaces), in order of thickness. These are shown on specs and prints by arrows with one, two, or three feathers, respectively.

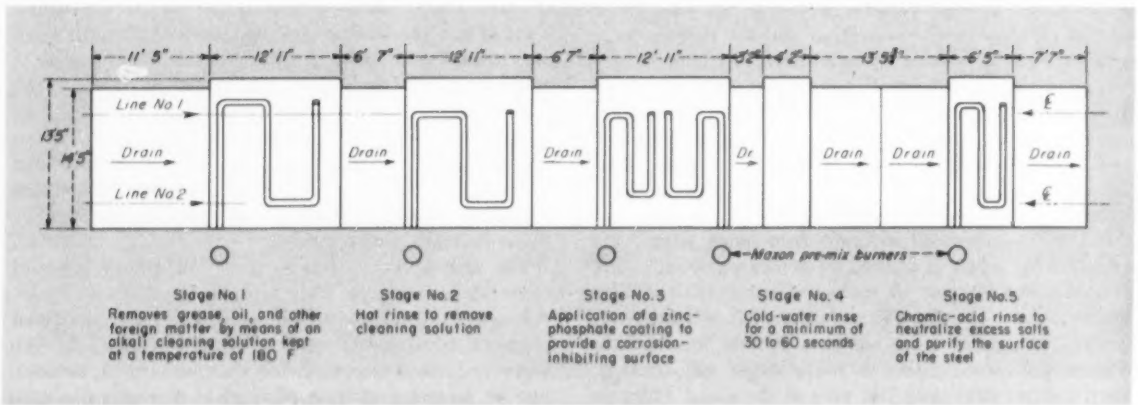
The size of the painting operation makes pigment recovery economical. This is done in a special room. All gray paint sprayed is produced from reclaimed pigment, plus added white. Pigment trapped by the water curtain is filtered twice, then two resins, thinner, and an aqueous solution of another ingredient to give hard finish and high gloss are added and the mixture thoroughly blended in closed tanks. Reclaimed paint is pumped back to the mixing room for re-use.



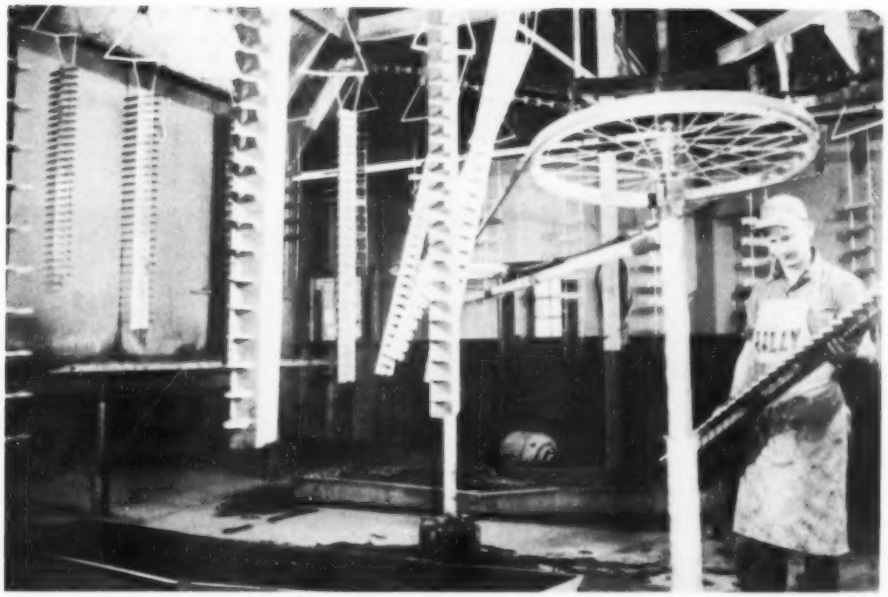
FRAME-AND-FIN LOUVER enters 120-ft-long, five-stage washer through one of two narrow, 6-ft-high ports. In background, light at opened side-inspection doors shows relative position of second stage; water spray after caustic spray

SECOND STAGE IS WATER SPRAY to clean off alkaline solution from first stage. Rotating wheels are made up from conventional water-pipe fittings, with each nozzle turned slightly toward the center of the wheel to throw spray at a slant, increasing coverage. Louvers are hung from clevises on conveyor with two wire hangers; each of the two conveyors passes between a set of two spray wheels. During daily operation, doors are locked shut; sprayers operate continuously with water at about 180F

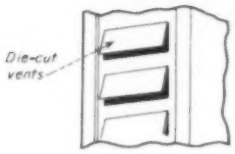


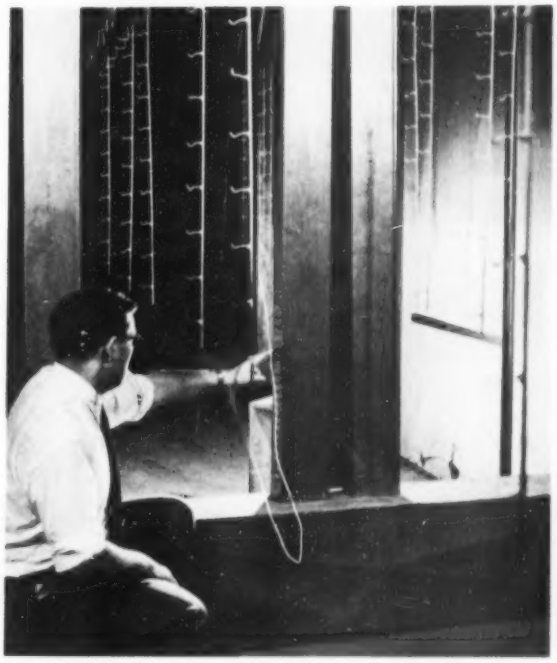


WASHER LAYOUT puts water sprays between cleaning sprays and baths. First stage is spray with Parko alkaline solution (1200 to 1600 gal. in system). Second is water spray (photo above). Third is Bonderite 160 bath. Fourth is another water spray, and fifth is dip in Parkoline chromic-acid, phosphoric-acid solution. Result is clean, rust-inhibited metal surfaces that take paint readily

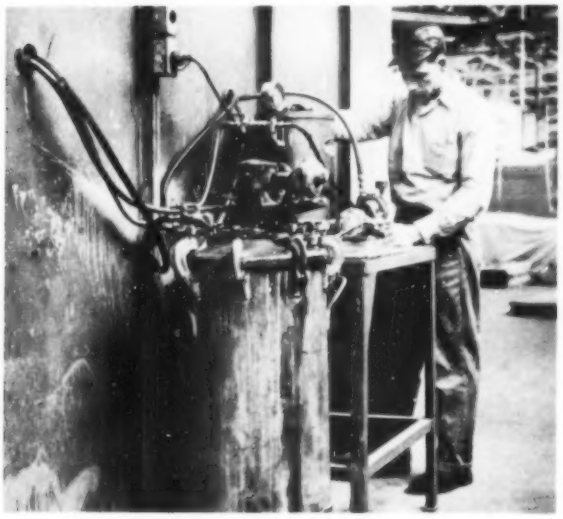


LOUVERS ARE TILTED TO DRAIN OFF WATER as conveyor makes turn out of wash tank. Free-wheeling bicycle wheels act as pulleys, air hose is belt. Support frame is movable so it can be adjusted to tip work slightly. Some small parts, washed in the same cycle, don't usually require tipping because they have no horizontal surfaces nor many joints that catch water

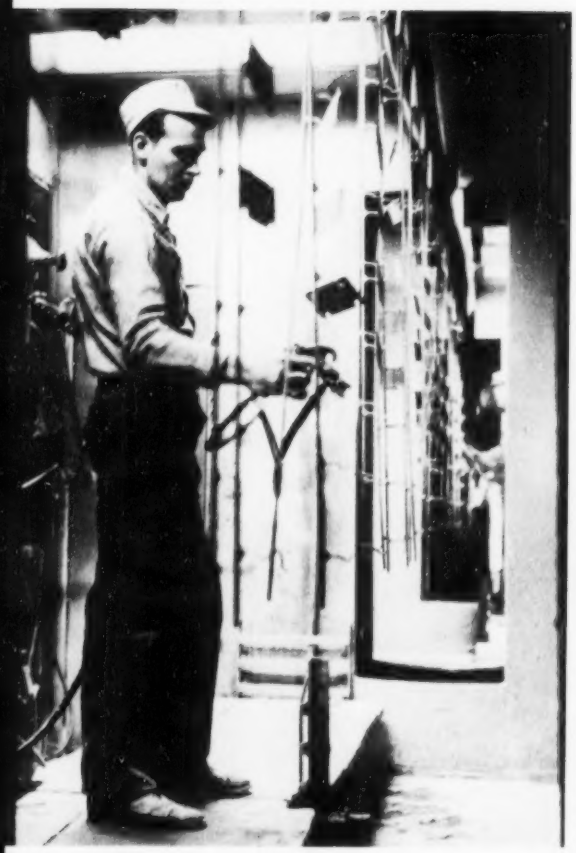




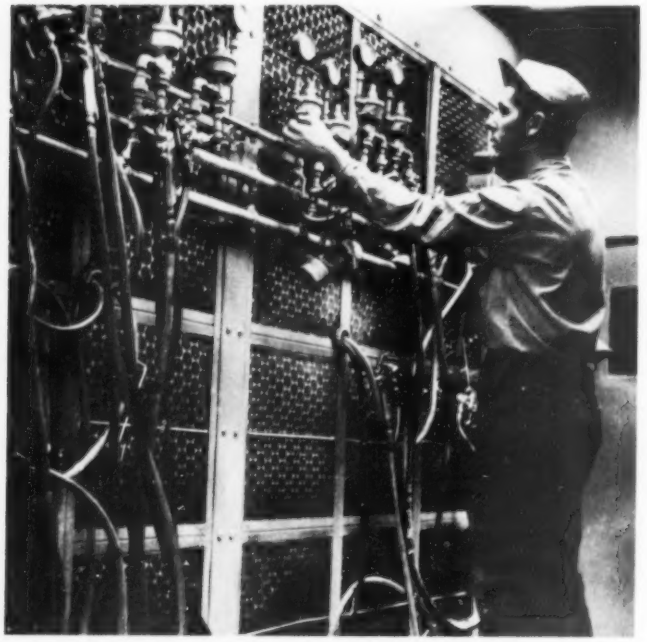
GAS DRYING OVEN, through which conveyors pass on way to paint booths, is fitted with air curtain that holds in heated air, economizing on gas. Ducts collect hot air from exhaust system, take it to vented exit openings of oven. Hot-air blast sweeps around conveyor and parts, trapping hot air inside oven



EXTRA PAINT COLOR (aluminum is not frequently used) and paint heater are against back wall of paint booth. Larger tank is continuously circulated reserve of aluminum paint, controlled from inside paint booth. Bede paint heater (on table) has thermostatic control to raise any paint being applied to 170F

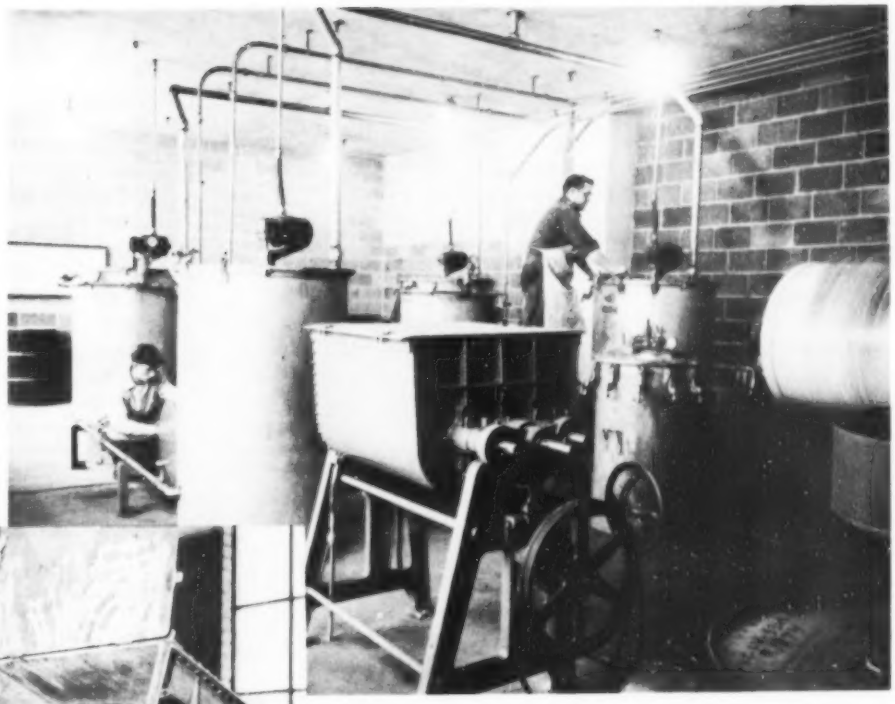


PAINT SPRAYERS WORK IN TWO SUCCESSIVE BOOTHS, plus inspection, touch-up booth at far end. One or two men spray to right in first booth, another one or two to left in second. Work load is balanced by loading of wire carriers; work on one of these small-parts carriers equals work on one full-size louver. View here is looking through air-locked conveyor entry



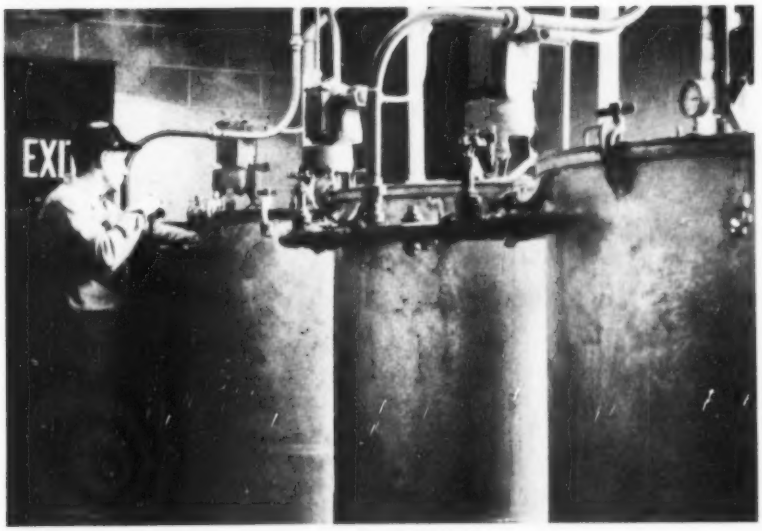
SHUNTING VALVES, AIR LINES, AND PAINT LINES are in front of padded air screen, through which controlled-atmosphere air from overhead heater and conditioner is filtered. Operator can switch from one color to either of other two here, without leaving booth

PAINTER WORKS ON ADJUSTABLE-HEIGHT STAND, 3 ft wide by 20 ft long, that allows for variations in work length and operator height. Slanted water curtain in rear picks up most waste paint. Sprayers use face mask only when large-area parts bounce back high percentage of paint spray — usually not necessary. Paint is delivered to guns at 30 psi. Air flow from filter behind operator keeps most spray off the floor and walls



RECLAIMING ROOM SAVES PAINT for re-use on large scale. Dough mixer (bakery type) in foreground and rotary drum at right do blending. Auxiliary tank (rear, between mixers) is for third color. Remaining four large tanks are storage units with circulating paddles, from which fully mixed paints are pumped to paint-storage room closer to spray booths

DOUGH MIXER (bakery style) blends reclaimed pigment and vehicle solution to produce economical spray paint. Bent S-shaped beaters are operated by motor and gearing. Precision switch in motor power line must be closed by lever at rear, which prevents operations if mixer is tilted for dumping



STORAGE ROOM FEEDS EACH COLOR LINE by means of two circulating tanks. One feeds while other is filled from mixing room; then shunting is done when first tank goes empty

FINISH-PAINTED CHASSIS ON CONVEYOR go from painting section through fire doors to assembly room; there they are palletized and held for use. Fire doors are fitted with wall switches, which are thrown when doors are pushed back, fully open. Switches close conveyor-motor circuits; therefore whole conveyor is disconnected if door is closed – this is also a handy method of stopping conveyor for emergency other than fire

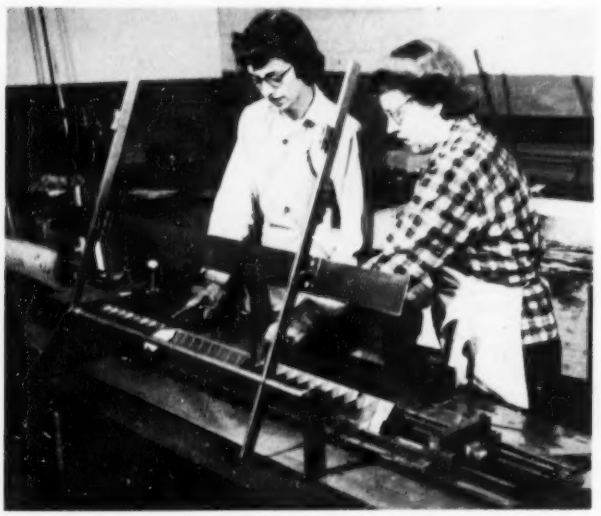
ASSEMBLY is on incentive, too

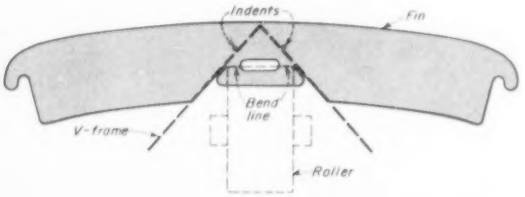
Assembly is largely with self-tapping screws, although several bending, soldering, or welding operations are performed. Fixture quantities range from a few of special designs to large numbers of standard lines, and many components are standard. Where quantities justify, special assembly fixtures and tools are developed like those immediately following.

Standard fixtures are assembled along a dozen pulse belts. Assembly groups operate on incentive, so pulse times are set by group leaders to suit the group. A typical assembly sequence is:

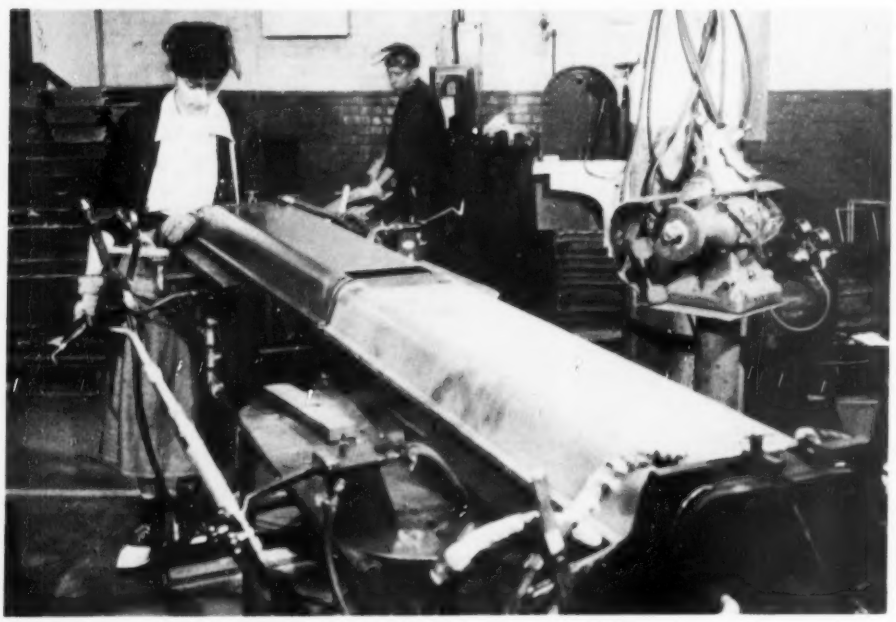
1. Screw lampholders to end plates.
2. Screw end plate to chassis.
3. Make wire connections.
4. Add hanging chains for louvers.
5. Attach rating and underwriters' labels.
6. Install ballast.
7. Fasten plastic shielding support.
8. Inspect and test fixture, including lighting.
9. Attach reflectors.
10. Pack in carton.

Electrical subassemblies are also made in this department where necessary, although most electrical parts are received ready for assembly from other plants.

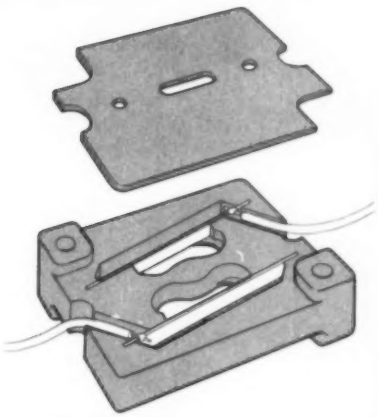




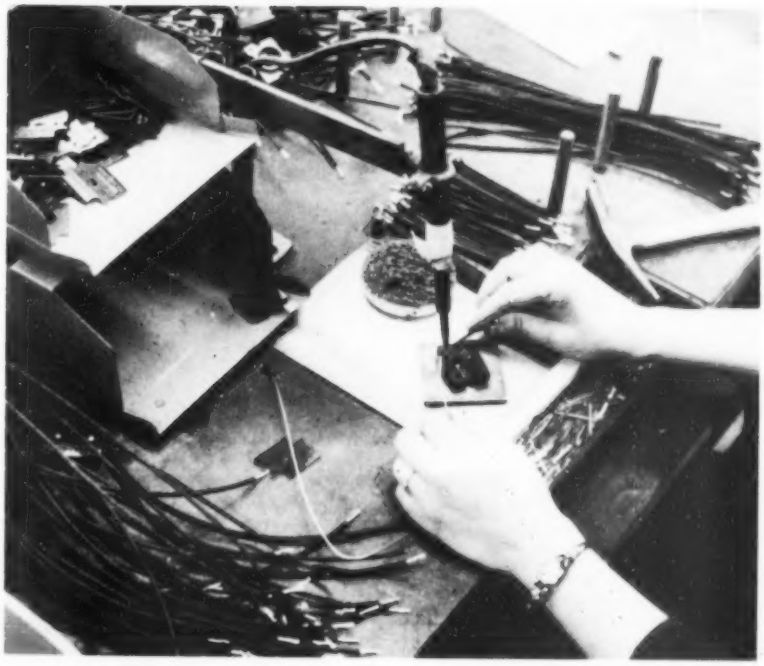
LOUVER FIXTURE IS ASSEMBLED by locating slotted, V-bent frame on table between stops, hand-inserting 29 (or 14 if small louver) fins, closing clamp arm, then hitting switch buttons. Closed circuit energizes pneumatic cylinder at left, which traverses hardened-steel roller (right) under frame, which bends over tabs on fins to hold them in place. Cylinder is double-acting, so roller passes one way for one louver, then opposite way for next. Roller is clevised on end of piston rod; clevis block rides on two rails inserted in table slot. The clamping device assures accurate alignment of fins and the roller bender prevents looseness and fin rattle



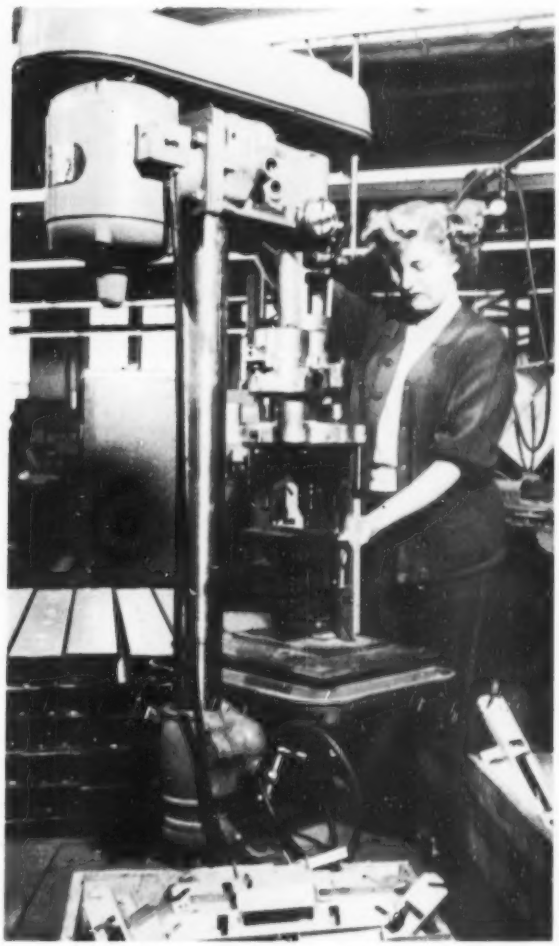
DOUBLE-END GAS-TORCH WELDING SETUP for 4-ft industrial reflectors allows two operators to attach end plates to formed chassis independently. Side arm clamps grip chassis; end clamps position end plates; clamp pads are designed to leave edges completely open. One end of welding table is higher than the other because one operator is short, other is tall



STARTER-SOCKET ASSEMBLY IS MADE with pedal-depressed soldering iron that heats brass terminal strip and braided, shielded wire for junction. Operator picks up plastic socket (lower parts tray), inserts two brass strips (small tray in front of steel work plate), gets wire from bundle (upper right), and applies solder (flux core) with left hand. Tray (right hand) has chamfered holes in bottom to catch steel rivets heads up. Operator picks up rivets with magnetized hammer, adds fiber cover to socket, inserts rivet through cover into force-fit hole in socket, and drives it tight. Plastic parts are produced at Sylvania's Parts Div, Warren, Pa.



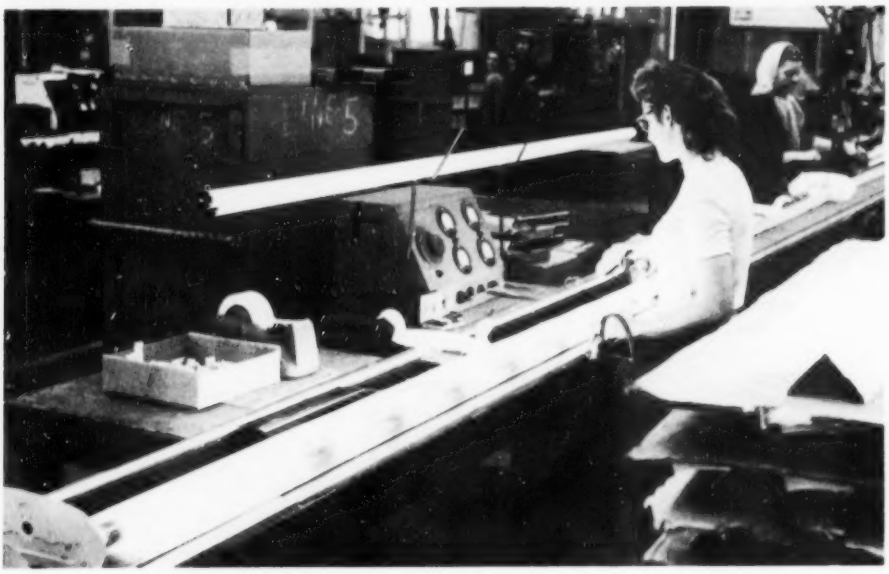
OVERHEAD AIRLINES for pneumatic screwdrivers and wrenches serve assembly tables. Here operator is attaching end fitting for bathroom-mirror lamp fixture to narrow chassis that carries one lamp. End piece is one of few sheet-metal parts fabricated and painted at another Sylvania plant



FIVE-SPINDLE TAPPING HEAD on Delta drillpress taps holes in steel lamp-bracket supports that can't be pierced by self-tapping screws. Two brackets for four-lamp fixtures are worked at same time in double-purpose machine fixture rigged for two work positions. It can be moved readily to a convenient point in assembly

ASSEMBLY OF SMALL RESIDENTIAL FIXTURE is done on another belt-conveyor bench. To basic chassis is added end plates, louver (if any), switch, wiring, ballast, and starter

FLEXOPULSE CONTROL ON ASSEMBLY CONVEYOR-BENCH (also two previous pictures) times motion of belt in pulses. All assembly operations are time-studied and adjusted so relative work for each operator is about the same. Belt is set to advance work one position at each pulse, then pause for working time. Most complicated job at present takes 115 sec working time, 10 sec for belt motion, resulting in 29 fully assembled pieces per hr. Fixtures with 6 and 8 lamps take longer. Belt speed is set to suit assembly group, which works on incentive basis



FINAL FIXTURE TEST includes check of current, action of starter and ballast under full load, and switch action. Lamps are drawn from stock on assembly bench, inserted in fixtures as they are tested

SHIELDED METERS SIMPLIFY TEST JOB, showing pointer swing only if lamps test OK. Operator is thereby relieved of interpolating and making decisions in on-the-line cases. If she can see needle, test is passable

PACKAGE DROP at back corner of assembly floor moves boxed fixtures down to first-floor shipping room. Roller conveyor along windows picks up boxes from pulse-belt feeder lines. Carton operates pressure switch under one roller, to actuate pneumatic cylinder that pushes frame to right, shifting box to belt conveyor leading to floor below

MULTIGRAPH DUPLICATING MACHINE in assembly-room office does all job-record, office-form, instruction-sheet, and label printing, making changes easy and rapid, and eliminating expense of outside jobs

SPECIAL FIXTURES, done in job lots, get same general treatment as production items, including final inspection on paint job. Circular louvers shown are for incandescent-lamp fixtures

NATURAL-GAS SUPPLY MAY BE INTERRUPTED at times for varying periods. Therefore the propane storage tanks and mixing room in foreground have been added for standby. Tanks hold 30,000 gal. of propane as a liquid under 150 psi. The fixture plant (background) is a former warehouse and has excellent shipping facilities ▼

FOR REAL HELP TO SMALL BUSINESS

It is ironic that one of the first jobs of the Eisenhower administration, so widely, and erroneously, tagged as a "big business" administration, must be to go to the relief of small business. This is necessary because the preceding administration, while continually proclaiming its tender regard for small business, actually impaired gravely the ability of small business to carry on successfully. This it did in the necessary haste of devising an emergency tax program to finance rearmament and the Korean War. Now the new administration must revise this tax structure to give small business a chance to make its key contribution to an expanding American economy.

How Taxes Hurt Small Business

Since the outbreak of the Korean War, small business has been handicapped by two principal features of the emergency tax program:

1) Many small firms are unable to retain enough of their earnings to provide for expansion because these earnings are drastically limited by the excess profits tax.

2) Small companies have received a very small share of the tax concessions allowed by the federal government to encourage construction of defense facilities.

A small business that succeeds and hence grows is particularly hard hit by the excess profits tax. That tax, of course, applies to corporations having a net income of more than $25,000 per year. It results in taking up to 82 cents on every dollar of profit that the company earns above what is called an "excess profits credit." For most small companies the credit depends on what was earned in 1946-49. This creates an element of gamble and discrimination in determining the amount of tax to be paid. Time has proved that it is impossible to select a base period for the tax that is fair to all companies. A young company starting in 1946-49 is peculiarly vulnerable, as its earnings in that period were necessarily low. Even on modest earnings today, it would pay a high excess profits tax.

It is true that Congress wrote into the excess profits tax law provisions to lessen the impact of the tax on growing companies. However, none of these provisions in practice has given much relief to small business.

"Relief" Provisions Give Little Relief

Small firms rely almost entirely on retained earnings to provide funds for improving their plants and equipment. They get very little help from the provisions (1) that no more than 70 per cent of total profits can be taxed away, (2) that additional earnings are allowed on an increase of invested capital or (3) that growing companies are allowed a

rate of return on capital equal to the industry average.

Most large firms can obtain additional funds in the securities market. But small firms find it difficult to increase their capital by selling securities, since investors generally prefer the stocks or bonds of nationally known and seasoned companies. Few small companies, therefore, can reduce their tax burdens by increasing their invested capital, and few can meet their needs for equity capital if their rates of profit are no higher than those of the leading companies which generally set the average profit.

Small business has been equally at a disadvantage in the matter of accelerated depreciation for tax purposes. The government has encouraged a great expansion of our industrial plant, despite the very high rate of taxation on corporate earnings, by granting certificates of accelerated amortization on new plants built to support the defense program. These certificates allow business to charge off the cost of defense plants at a rapid rate. This decreases the earnings that are subject to taxes, and so increases the part of the earnings that may be retained in the business.

Growth is Stifled

But most of these tax concessions have been made to large firms especially equipped to handle the complex problems of defense production. Of the $12 billion of new facilities so far approved for fast amortization, only 11 per cent are for companies with less than 500 employees, although the share of such companies in the normal civilian business is about 30 per cent. In only 2 of 12 industries studied by the Small Defense Plants Administration were small firms receiving what was estimated to be a fair share of the total tax amortization awarded.

Because they are unable either to retain enough earnings after taxes or to step up their depreciation allowances, most small firms are unable to keep up in the race to expand and modernize plant capacity. The Small Defense Plants Administrator, in his report to Congress, emphasized that small companies have been unable to do their full part in the defense program for lack of capital.

The Council of State Chambers of Commerce recently published an eight-state survey showing widespread cutbacks of plans for new plants by small and medium-sized companies. According to this report, "high federal taxes enacted since the beginning of the Korean War appear to be placing an effective brake on the rate of industrial expansion in all the states surveyed and probably in the 48 states generally . . . It is principally the small and medium-sized companies whose growth is being stifled."

Some Ways to Help

The first step to relieve small companies should be to free them from the excess profits tax. The nation as a whole would be far better off if the excess profits tax were allowed to die as scheduled on June 30, since the tax promotes waste as it stifles incentives. It is quite possible, however, that the politics of tax reduction, as opposed to the economics, will prevent the elimination of the tax during 1953.

If the tax is extended, provision should be made for a much broader exemption to smaller corporations. If net income up to $100,000 a year, which in these days still constitutes small business, were exempted from the tax, the loss of revenue to the government would be about $175 million. This relatively small amount could easily be offset by an increase in employment and incomes if small business is freed from its financial strait jacket and allowed to expand. Careful attention should be given also to the possibilities of allowing a higher rate of return on the first $1 million of capital (roughly the amount it takes to provide 100 jobs) and of making special accelerated depreciation allowances to smaller firms. This is a matter so important that we shall return to it in a future editorial.

Relief for small business—relief from a financial paralysis that has kept it from playing its dynamic part as a growth element in our economy—would do much to give the lie to the notion that the Eisenhower administration is a "big business" operation. Much more important, it would be a long stride toward releasing the dynamic energies of many small businesses and businessmen to forward a continuing and expanding prosperity.

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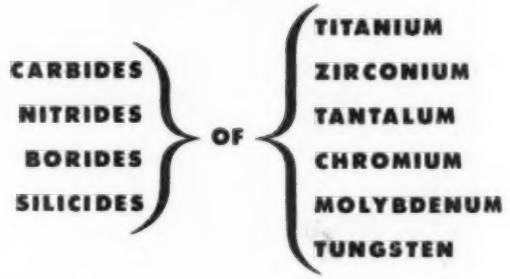
THESE ARE NEW HIGH-TEMPERATURE MATERIALS



Seven years of research and more have gone into the field of high-temperature materials produced by powder metallurgy.

Now a new series of substances is emerging from the laboratories.

These are the so-called hard metals; chemical compounds in composition, but with metallic physical properties.

Their application to such high-temperature designs as jet engines, gas turbines, and nuclear powerplants will make necessary, in many cases, complete redesign to take full advantage of their special properties.

Out of the almost unlimited number of possible combinations above, we herewith take two — titanium carbide and the borides of molybdenum — to show how recent experimental work has changed the metalworker's approach to product design, forming and machining, and production planning.

BY DR PAUL SCHWARZKOPF, AMERICAN ELECTRO METAL CORP

TITANIUM CARBIDE

Like many of the other new hard metals, titanium carbide has hardness and physical strength at elevated temperatures. It can withstand the heat, wear, and inertia forces in a jet engine much better than ordinary metals, once formed to shape. Though it is much more difficult to machine than pure titanium (which is tough enough), it is not a problem in fabrication, for the only practical method of working the material is with powder-metallurgy methods, which answers the forming problem by eliminating machining troubles.

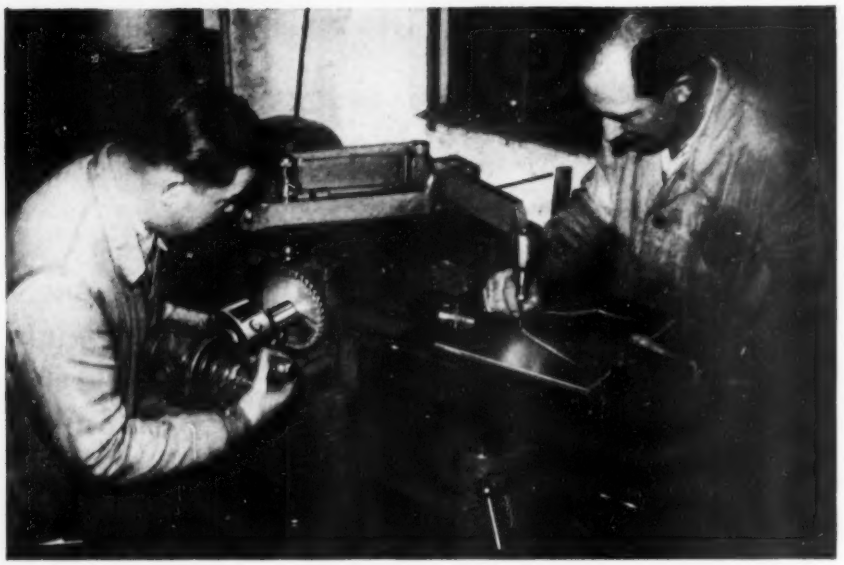
For example, the steps on making the rotor for a simple gas turbine are these:

First, the wheel blank is prepared by compacting the metal powder to size and shape in press dies. Allowances are made in the die design to take care of shrinkage, which takes place later, during sintering. It is possible to hold tolerances, after sintering, of 0.001 to 0.003 in. The compacted wheel is a disk with an OD and thickness exceeding that of the final complete rotor.

Next, the compact is presintered. Furnace heating is taken only far enough to make the blank hold together under careful handling; the material has the consistency of graphite at this time. Physical and chemical changes within the material have only barely started, therefore the wheel is easily machined by conventional methods.

Now, the hub and faces are cut to shape (on a lathe), and the buckets are cut (on a light miller). A templet arrangement takes care of the bucket profiles, and a dividing head handles indexing. Machining at this stage is almost completed, leaving just as little material as possible for a final, touchup machining job when the rotor is hardened, after sintering.

Next, the rotor is completely sintered in a heat-treat furnace, consolidating the structure and



PANTOGRAPH MILLER with dividing head cuts bucket slots in rotor for small experimental gas turbine. Blank is in presintered state, machines like graphite

fully densifying the material. The result is a rotor that is strong, hard, and durable.

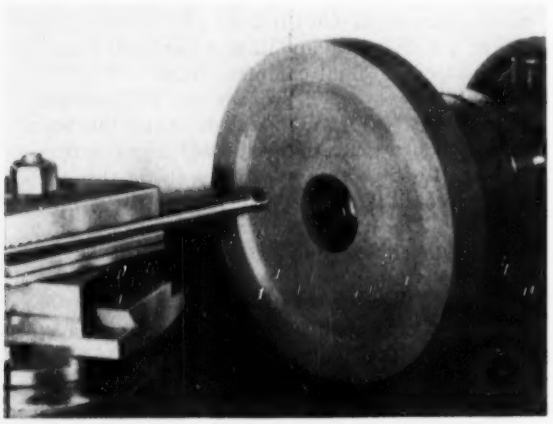
Finally, grinding is done to clean up the rotor surface. On an experimental basis, diamond wheels, Method-X, ultrasonic machining, and sometimes even carbide cutting tools have been used for these operations. An important point regarding this final machining is that, although difficult, there is little work to do. Therefore, even a machining process that would seem slow and inefficient in normal production of steel items is workable here, because the machining is but a small part of the whole production cycle.

The result is an integral-blade gas-turbine rotor without the usual Christmas-tree slots and root design, heavy rim, and thick blade shanks that are characteristic of conventional rotors. This factor indicates how the basic design of the turbine may be changed, for efficiency, by powder metallurgy.

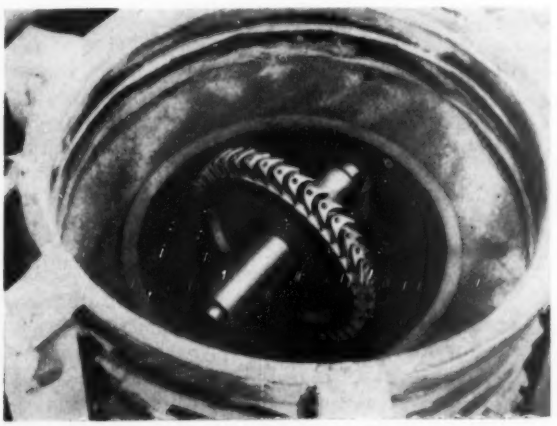
In the customary design, wheel and buckets are different materials, and usually the weaker parts of the rotor are the areas of contact between the separately-produced wheel and buckets; the new technique of producing the entire assembly from one piece eliminates these points of weakness.

In addition, it will become possible, according to test results, to use titanium carbide in the stator of the turbine and other parts that work at high temperatures, allowing further redesign for higher speeds, less weight, higher operating temperatures, and so more power.

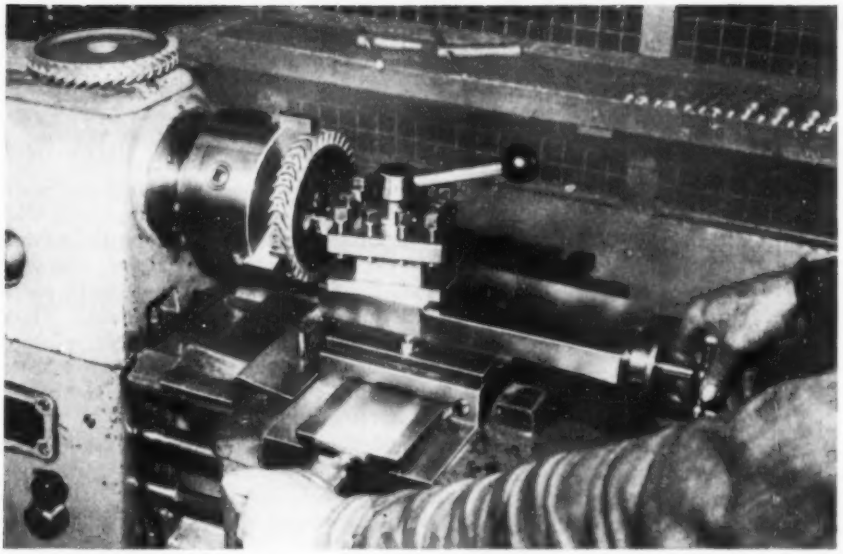
Estimates of efficiency increases as a direct result of the use of powdered-titanium-carbide parts in the turbine mechanism run as high as 40%.



PRESINTERED TITANIUM-CARBIDE BLANK is set up on lathe with simple tooling for face- and hub-turning job. OD can be held to size through final sintering by providing proportional allowance for shrinkages



CUT ROTOR IS LOADED INTO FURNACE for final sintering. Shape is now complete except for touch-up grinding. In some cases even this is not required

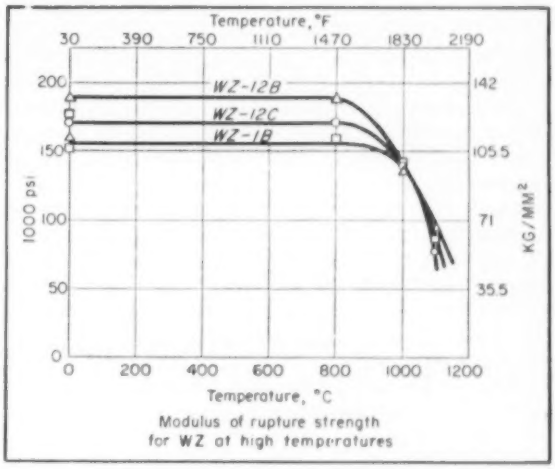


FINISH-MACHINING is done on turret lathe with carbide tools. Buckets may be touched up with diamond wheel, Method-X, or ultrasonic machine

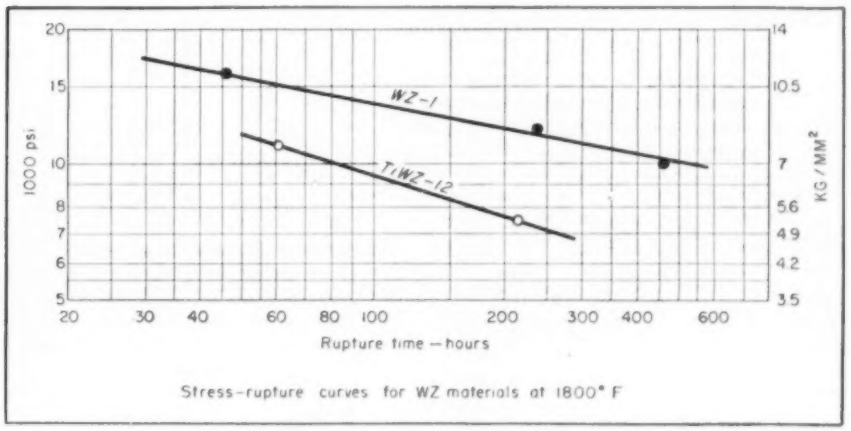
HARD METALS

The pivotal point on which design development turns in the high-temperature field is materials that can retain strength and corrosion resistance at elevated temperatures. Because a machine such as a jet engine works more efficiently as the temperature rises, present limits of operating temperature must be pushed up to increase power. If the present limit, about 1500F, could be raised to 1900F, the 40% increase in power would be possible.

Carbide materials, originally developed as cutting-tool materials, but now being applied to jet-engine blades, do have the strength and hardness required, even at elevated temperatures. But the corrosion resistance of these metals drops off as the engine temperature rises above 1500F. There seem to be two ways of getting around this stumbling block. First, the carbide composition of the mate-

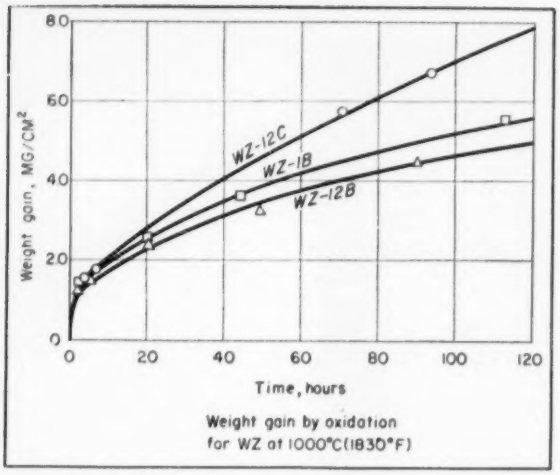


Modulus of rupture strength for WZ at high temperatures



Stress-rupture curves for WZ materials at 1800° F

TITANIUM-CARBIDE PROPERTIES vary between compositions, but follow similar curves. Rapid drop-off of strength over 1800F (above) indicates a limit to its application at high temperatures, but performance is still better than that of conventional materials



Weight gain by oxidation for WZ at 1000°C(1830°F)

rials may be modified to make them resistant to oxidation at higher temperatures. Second, a search for other hard metals that will work can be made.

Work on the first alternative has produced evidence that service temperatures for modified carbides can be pushed to as high as 1800 to 2000F without losing out in the fight against oxidation. Of all the carbides, titanium carbide is the most resistant to oxidation when heated; therefore, research has been concentrated on this material. Modifications include replacing the usual cobalt and nickel binder with corrosion-resistant chromium alloys, and increasing the proportion of binder to improve ductility. As can be seen from the accompanying curves, strength and oxidation resistance hold up well to 1800F for all three of the titanium-carbide variations (stress-rupture values were obtained from Firth Sterling Steel & Carbide Corp laboratories). In addition to strength and stability, the materials are lighter than conventional high-temperature materials (superalloys), with densities of 6.0 and 6.5 against 8.3 and 9.2. This is another point in favor of the new materials.

NEW TOOL MATERIALS

The second possibility—searching out new hard metals of different composition to stand up under tough conditions—appears to be the more promising approach for temperatures over 1900F. It is expected that borides and silicides will permit operating temperatures over 2500F. However, most of the information along this line is restricted.

As a byproduct of the search for high-temperature materials among the borides, a discovery was made. Because of previous experience with the development of earlier carbide materials, an eye was kept open for any hint of material that might compare with existing carbide cutting materials. Thus a double boride of molybdenum and nickel, Mo_2NiB_2, was identified and synthesized by Dr R Steinitz and Mr I Binder in the laboratory of American Electro Metal Corp.

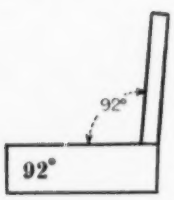
With the addition of molybdenum boride as a binding agent, the material can be formed into tool tips by powder metallurgy. Grinding and lapping to mirror finish produces sharp edges that allow cutting on a par with the carbides. In one experiment, a tool cut steel at 200 Bhn at 220 sfpm with a feed of 0.010 ipr and a cut depth of 0.100 in. Tool life is about the same as for carbide (in this test, cutting was done for 90 min.). The material can be substituted for tungsten carbide-cobalt tool materials in most cases with good results.

Performance of the material is not claimed to be superior to that of carbides, although brazing it to a steel shank is easier and its density is only about 60 to 66% of that carbide.

The important point is that the boride can be produced completely from domestic raw materials, which would mean independence from tungsten and cobalt imports. Boride tools could also be produced more economically than carbides, for the raw materials are cheaper, while production costs would be about the same. In a case of emergency, the boride provides a margin of safety in the availability of cutting materials of good quality.

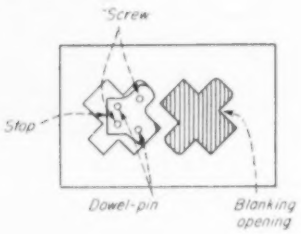
DIEMAKERS KINKS

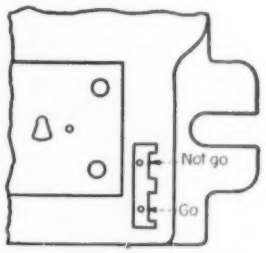
BY FEDERICO STRASSER



DIEMAKER'S SQUARES are useful when filing the angular clearance of blanking and punching openings. Make up a set (using 1/8 in. stock) ranging from 90 1/2° to 93°, varying by 1/2° and mark each one.

STOPS for heavy stock and irregularly shaped blanks should be screwed and doweled to the die plate. Make the stop of hardened tool steel.





A SNAP GAGE fastened to the die shoe serves to check both ends of strip sheared on a guillotine shear. Such strips are often not very accurate for width, which is essential if progressive dies are used, and coil strip is not being used for some reason.

Reference tables help you to shear economically

Do you buy sheets in too many sizes?

Do you preplan blank sizes for least waste?

If you don't, you had better read how Brown & Sharpe saves money on shearing operations

BY DONALD D AMISON, BROWN & SHARPE MFG CO

To get greater economy in use of sheet metal, we took two steps:

1. Surveyed our fabricated parts and chose two sizes of sheet that appeared to provide most economy when cut up on power shears.

2. Developed a series of tables that make it easy for the designer to select *the* sheet giving the greatest number of pieces, with the least waste. These tables often indicate to the designer that a fabricated part, as designed, involves too much scrap and should be redesigned.

We selected two sizes of sheets: 36×96 in. and 42×96 in., as the ones most suitable to our needs.

The four tables that we use avoid the necessity for making block layouts to see how many blanks can be cut. Also we know the gross weight per blank, the most economical method of shearing and the percentage of scrap. These tables are based on the simple relationship $W = S \div N$, where W equals the gross weight per piece, S is the theoretical weight of a sheet (we use gages 7, 10, 11,

Table I . . . PIECES PER SHEET

(Includes Allowance for Trim and Holding)

Part Dim In.	Sheet Dim 96	42	36	Part Dim In.	Sheet Dim 96	42	36
47 1/2	2			4 1/2	21		
41 1/2		1		4 7/16			8
35 1/2			1	4 5/16	22		
31 3/4	3			4 1/8	23	10	
23 5/16	4			3 15/16	24		9
20 3/4		2		3 3/4	25	11	
19 1/16	5			3 1/2			10
17 3/4			2	3 7/16		12	
15 7/16	6			3 3/16		13	11
13 3/4		3		3 1/8	30		
13 5/8	7			2 15/16		14	12
11 3/4	8		3	2 3/4		15	
10 1/2	9			2 11/16	35		13
10 3/8		4		2 9/16		16	
9 1/2	10			2 1/2			14
8 7/8			4	2 7/16		17	
8 5/16	11			2 3/8	40		
8 1/4		5		2 5/16			15
7 15/16	12			2 1/4		18	
7 5/16	13			2 3/16		19	16
7 1/16			5	2 1/16	45	20	17
6 7/8		6		1 15/16		21	18
6 3/4	14			1 7/8	50	22	
6 5/16	15			1 13/16			19
5 15/16	16	7		1 3/4			20
5 7/8			6	1 5/8		25	
5 9/16	17			1 9/16	60		
5 1/4	18			1 3/8		30	25
5 3/16		8		1 5/16	70		
5 1/16			7	1 3/16	80	35	
5	19			1 1/8			31
4 3/4	20			1	94	40	33
4 9/16		9					

Table III . . . BLANK AREA IN SQ FT FROM PART DIMENSIONS IN INCHES

	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/8	2 1/4	2 3/8	2 1/2	2 5/8	2 3/4	2 7/8	3	3 1/8	3 1/4	3 3/8	3 1/2	3 5/8	3 3/4	3 7/8	4
1	.007	.011	.014	.017	.021	.024	.028	.031	.035	.038	.042	.045	.049	.052	.056	.059	.063	.066	.069	.073	.076	.080	.083	.087	.090
1 1/8		.016	.021	.026	.031	.036	.042	.047	.052	.057	.063	.068	.073	.078	.083	.089	.094	.099	.104	.109	.115	.120	.125	.130	.135
1 1/4			.028	.035	.042	.049	.056	.063	.069	.076	.083	.090	.097	.104	.111	.118	.125	.132	.139	.146	.153	.160	.167	.174	.181
1 3/8				.043	.052	.061	.069	.078	.087	.095	.104	.113	.122	.130	.139	.148	.156	.165	.174	.182	.191	.200	.208	.217	.226
1 1/2					.063	.073	.083	.094	.104	.115	.125	.135	.146	.156	.167	.177	.188	.198	.208	.219	.229	.240	.250	.260	.271
1 5/8						.085	.097	.109	.122	.134	.146	.158	.170	.182	.194	.207	.219	.231	.243	.255	.267	.280	.292	.304	.316
1 3/4							.111	.125	.139	.153	.167	.181	.194	.208	.222	.236	.250	.264	.278	.292	.306	.319	.333	.347	.361
1 7/8								.141	.156	.172	.188	.203	.219	.234	.250	.266	.281	.297	.313	.328	.344	.359	.375	.391	.406
2									.174	.191	.208	.226	.243	.260	.278	.295	.313	.330	.347	.365	.382	.399	.417	.434	.451
2 1/8										.210	.229	.248	.267	.286	.306	.324	.344	.363	.382	.402	.421	.439	.458	.477	.497
2 1/4											.250	.271	.292	.313	.333	.354	.375	.396	.417	.438	.458	.479	.500	.521	.542
2 3/8												.293	.316	.339	.361	.384	.406	.429	.451	.474	.497	.519	.542	.564	.587
2 1/2													.340	.365	.389	.413	.439	.462	.486	.510	.535	.559	.583	.608	.632
2 5/8														.391	.417	.443	.469	.495	.521	.547	.573	.599	.625	.651	.677
2 3/4															.444	.472	.500	.528	.556	.583	.611	.639	.667	.694	.722
2 7/8																.502	.531	.561	.590	.620	.649	.679	.708	.738	.767
3																	.563	.594	.625	.656	.688	.719	.750	.781	.813
3 1/8																		.627	.660	.693	.726	.759	.792	.825	.859
3 1/4																			.694	.729	.764	.799	.833	.868	.903
3 3/8																				.766	.802	.838	.875	.911	.948
3 1/2																					.840	.878	.917	.955	.993
3 5/8																						.918	.958	.998	1.038
3 3/4																							1.000	1.042	1.083
3 7/8																								1.086	1.129
4																									1.174

Table II ... GROSS WEIGHT OF PIECES CUT FROM TWO SHEETS

(Top figure—36 × 96-in. sheet; bottom figure—42 × 96-in. sheet)

No. Pcs.	Gage 7	10	11	12	16	20
100	1.80	1.35	1.20	1.05	.60	.36
	2.10	1.58	1.40	1.23	.70	.42
95	1.89	1.42	1.26	1.11	.63	.38
	2.21	1.66	1.47	1.29	.74	.44
90	2.00	1.50	1.33	1.17	.67	.40
	2.33	1.76	1.56	1.37	.78	.47
85	2.12	1.59	1.41	1.24	.71	.42
	2.47	1.86	1.65	1.45	.82	.49
80	2.25	1.69	1.50	1.31	.75	.45
	2.63	1.98	1.75	1.54	.88	.53
75	2.40	1.80	1.60	1.40	.80	.48
	2.80	2.11	1.86	1.64	.93	.56
70	2.57	1.93	1.71	1.50	.86	.51
	3.00	2.26	2.00	1.76	1.00	.60
65	2.77	2.08	1.85	1.62	.92	.55
	3.23	2.43	2.15	1.89	1.08	.65
60	3.00	2.25	2.00	1.75	1.00	.60
	3.50	2.63	2.33	2.05	1.17	.70
55	3.27	2.45	2.18	1.91	1.09	.65
	3.82	2.87	2.55	2.24	1.27	.76
50	3.60	2.70	2.40	2.10	1.20	.72
	4.20	3.16	2.80	2.46	1.40	.84
49	3.67	2.76	2.45	2.14	1.22	.73
	4.29	3.22	2.86	2.51	1.43	.86
48	3.75	2.81	2.50	2.19	1.25	.75
	4.38	3.29	2.92	2.56	1.46	.88
47	3.83	2.87	2.55	2.23	1.28	.77
	4.47	3.36	2.98	2.62	1.49	.89
46	3.91	2.93	2.61	2.28	1.30	.78
	4.57	3.43	3.04	2.67	1.52	.91
45	4.00	3.00	2.67	2.33	1.33	.80
	4.67	3.51	3.11	2.73	1.56	.93
44	4.09	3.07	2.73	2.39	1.36	.82
	4.77	3.59	3.18	2.80	1.59	.95
43	4.19	3.14	2.79	2.44	1.40	.84
	4.88	3.67	3.26	2.86	1.63	.98
42	4.29	3.21	2.86	2.50	1.43	.86
	5.00	3.76	3.33	2.93	1.67	1.00
41	4.39	3.29	2.93	2.56	1.46	.88
	5.12	3.85	3.41	3.00	1.71	1.02
40	4.50	3.38	3.00	2.63	1.50	.90
	5.25	3.95	3.50	3.08	1.75	1.05
39	4.62	3.46	3.08	2.69	1.54	.92
	5.38	4.05	3.59	3.15	1.79	1.08
38	4.74	3.55	3.16	2.76	1.58	.95
	5.53	4.16	3.68	3.24	1.84	1.11
37	4.86	3.65	3.24	2.84	1.62	.97
	5.68	4.27	3.78	3.32	1.89	1.14
36	5.00	3.75	3.33	2.92	1.67	1.00
	5.83	4.39	3.89	3.42	1.94	1.17
35	5.14	3.86	3.43	3.00	1.71	1.03
	6.00	4.51	4.00	3.51	2.00	1.20
34	5.29	3.97	3.53	3.09	1.76	1.06
	6.18	4.65	4.12	3.62	2.06	1.24
33	5.45	4.09	3.64	3.18	1.82	1.09
	6.36	4.79	4.24	3.73	2.12	1.27
32	5.63	4.22	3.75	3.28	1.88	1.13
	6.56	4.94	4.38	3.84	2.19	1.31
31	5.81	4.35	3.87	3.39	1.94	1.16
	6.77	5.10	4.52	3.97	2.26	1.35
30	6.00	4.50	4.00	3.50	2.00	1.20
	7.00	5.26	4.67	4.10	2.33	1.40
29	6.21	4.66	4.14	3.62	2.07	1.24
	7.24	5.45	4.83	4.24	2.41	1.45
28	6.43	4.82	4.29	3.75	2.14	1.29
	7.50	5.64	5.00	4.39	2.50	1.50
27	6.67	5.00	4.44	3.89	2.22	1.33
	7.78	5.85	5.19	4.56	2.59	1.56
26	6.92	5.19	4.62	4.04	2.31	1.38
	8.08	6.08	5.38	4.73	2.69	1.62
25	7.20	5.40	4.80	4.20	2.40	1.44
	8.40	6.32	5.60	4.92	2.80	1.68
24	7.50	5.63	5.00	4.38	2.50	1.50
	8.75	6.58	5.83	5.13	2.92	1.75
23	7.83	5.87	5.22	4.57	2.61	1.57
	9.13	6.87	6.09	5.35	3.04	1.83
22	8.18	6.14	5.45	4.77	2.73	1.64
	9.55	7.18	6.36	5.59	3.18	1.91
21	8.57	6.43	5.71	5.00	2.86	1.71
	10.00	7.52	6.67	5.86	3.33	2.00
20	9.00	6.75	6.00	5.25	3.00	1.80
	10.50	7.90	7.00	6.15	3.50	2.10
19	9.47	7.11	6.32	5.53	3.16	1.89
	11.05	8.32	7.37	6.47	3.68	2.21
18	10.00	7.50	6.67	5.83	3.33	2.00
	11.67	8.78	7.78	6.83	3.89	2.33
17	10.59	7.94	7.06	6.18	3.53	2.12
	12.35	9.29	8.24	7.24	4.12	2.47
16	11.25	8.44	7.50	6.56	3.75	2.25
	13.13	9.87	8.75	7.69	4.38	2.63
15	12.00	9.00	8.00	7.00	4.00	2.40
	14.00	10.53	9.33	8.20	4.67	2.80
14	12.86	9.64	8.57	7.50	4.29	2.57
	15.00	11.29	10.00	8.79	5.00	3.00
13	13.85	10.38	9.23	8.08	4.62	2.77
	16.15	12.15	10.77	9.46	5.38	3.23
12	15.00	11.25	10.00	8.75	5.00	3.00
	17.50	13.17	11.67	10.25	5.83	3.50
11	16.36	12.27	10.91	9.55	5.45	3.27
	19.09	14.36	12.73	11.18	6.36	3.82
10	18.00	13.50	12.00	10.50	6.00	3.60
	21.00	15.80	14.00	12.30	7.00	4.20
9	20.00	15.00	13.33	11.67	6.67	4.00
	23.33	17.56	15.56	13.67	7.78	4.67
8	22.50	16.88	15.00	13.13	7.50	4.50
	26.25	19.75	17.50	15.38	8.75	5.25
7	25.71	19.29	17.14	15.00	8.57	5.14
	30.00	22.57	20.00	17.57	10.00	6.00
6	30.00	22.50	20.00	17.50	10.00	6.00
	35.00	26.33	23.33	20.50	11.67	7.00
5	36.00	27.00	24.00	21.00	12.00	7.20
	42.00	31.60	28.00	24.60	14.00	8.40
4	45.00	33.75	30.00	26.25	15.00	9.00
	52.50	39.50	35.00	30.75	17.50	10.50
3	60.00	45.00	40.00	35.00	20.00	12.00
	70.00	52.67	46.67	41.00	23.33	14.00
2	90.00	67.50	60.00	52.50	30.00	18.00
	105.00	79.00	70.00	61.50	35.00	21.00
1	180.00	135.00	120.00	105.00	60.00	36.00
	210.00	158.00	140.00	123.00	70.00	42.00

Table IV . . . SCRAP PERCENTAGE

Sq Ft Used	Sheet Size 36x96	42x96	Sq Ft Used	Sheet Size 36x96	42x96
12	50.0	57.0	20.5	15.0	27.0
12.5	48.0	55.0	21	12.5	25.0
13	46.0	53.5	21.5	10.0	23.0
13.5	44.0	52.0	22	8.0	21.5
14	42.0	50.0	22.5	6.0	20.0
14.5	40.0	48.0	23	4.0	18.0
15	37.5	46.0	23.5	2.0	16.0
15.5	35.0	45.0	24	0.0	14.0
16	33.0	43.0	24.5		12.5
16.5	31.0	41.0	25		11.0
17	29.0	39.0	25.5		09.0
17.5	27.0	37.5	26		07.0
18	25.0	36.0	26.5		05.0
18.5	23.0	34.0	27		03.0
19	21.0	32.0	27.5		02.0
19.5	19.0	30.0	28.0		00.0
20	17.0	29.0			

12, 16 and 20), and *N* equals the number of pieces of specified dimensions.

Table I is divided into "breaking points" in respect to blank dimensions that can be sheared from a sheet 96 in. long by either 42 or 36 in. wide. From this table, the greatest number of pieces that can be cut from a given size of sheet is calculated.

EXAMPLE: A piece 11½×8 in. is desired. In Table 1, first work with the 11½-in. part dimension. In the 96-in. column you will find that the breaking point is 8, meaning that not more than 8 pc can be cut from the lengthwise dimension of the sheet. Follow the same procedure for width of sheet, using 42- and 36-in. columns. You will see that the breaking point is 3 in both cases. Repeat the procedure for the 8-in. part dimension.

Until you become familiar with application of the table, and can estimate the maximum number of pieces by inspection, record your findings:

Part Dimensions	Sheet Dimensions 96	42	36
	Pieces per Dimension		
11½	8	3	3
8	11	5	4

By cross multiplication you will find that it is desirable to cut the 11½-in. dimension on the length of a 96×42-in. sheet. Here are the figures:

For the 11½-in. dimension lengthwise of a 96-in. sheet, the number of pieces equals:

96×36-in. sheet—8×4 = 32

96×42-in. sheet—8×5 = 40

For the 8-in. dimension lengthwise on a 96-in. sheet, the number of pieces equals:

96×36-in. sheet—11×3 = 33

96×42-in. sheet—11×3 = 33

It is obvious that use of the 96×42-in. sheet is most economical in the case of the 11½×8-in. blank. Table II confirms this, and also enables you to obtain the gross weight per piece for any of six sheet gages. Suppose you are dealing with 7-gage stock. For 40 pc cut from a 96×42-in. sheet, the gross weight per piece is 5.25 lb. For 33 pieces cut from a 96×36-in. sheet, the gross weight per piece is 5.45 lb. These figures confirm your choice of the 96×42-in. sheet.

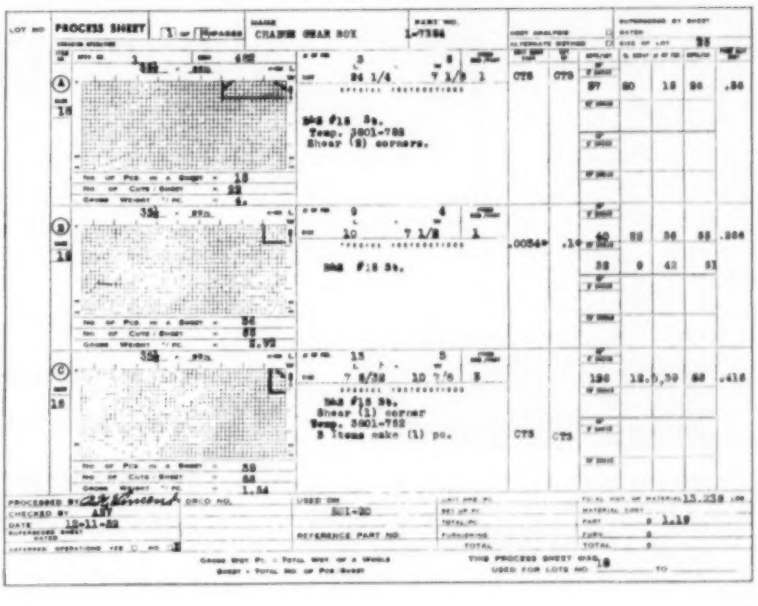
Suppose you want to know the percentage of scrap. Tables III and IV supply the information.

Conversion of square inches in the blank to square feet is performed with the use of Table III. A piece measuring 11½×8 in. contains 0.639 sq ft. Multiply this by 40 (the number of pieces cut from a 9×42-in. sheet) to obtain 25.56 sq ft. as the amount of useful material. The balance is scrap.

Table IV is based on the square feet available in the two sizes of sheets and reads directly the percentage of scrap that will be obtained. Under the "Ft Used" column read down until you come to 25.5, which is closest to the 25.56 figure previously calculated. Under the 96×42-in. column it will be seen that the corresponding amount of scrap equals 9%.

If pieces are larger than 1 sq ft (the top limit for Table III), it is easy to find the area in square feet. Make a simple box diagram if you wish, or perform the calculations largely in your head. Example: what is the area in square feet of a blank measuring 30×10 in. Break this into three sections of say 10×10 in. From Table III, the area of a 10×10-in. blank is 0.694 sq ft. For the three sections area is 3×0.694, or 2.082 sq ft.

PROCESS SHEETS give complete shearing data to the shop (right). They show sheet size, blank orientation on the sheet, additional cuts such as corner shearing, blank dimensions, number of pieces, and cost



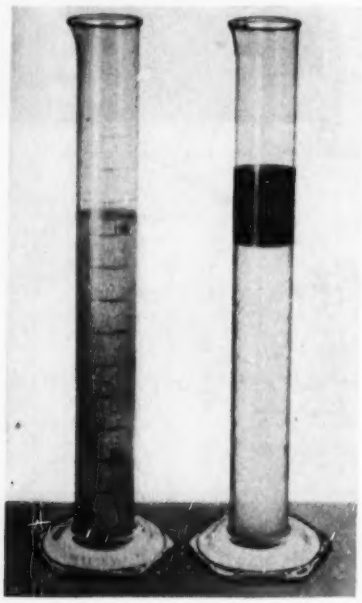
The Latest on Cutting Fluids

Cutting fluids are an important shop problem, as every shop executive knows; they can make or break the occasional tough job, and proper selection and control can spell the difference between profit and loss on normal production jobs. Yet, in many shops, cutting fluids still have an aura of mystery about them; they are bought by number or brand name and used with blind faith. Shop men seem to fear them; their performance and characteristics are suspected to be in some chemical realm outside the normal ability or knowledge.

Hence good articles on cutting fluids are hard to come by. Here are four, however, intended to help you understand cutting fluids and what they do. Together they provide an interesting symposium. First is a description of simple cutting fluids by a member of the laboratory staff of Pure Oil Company, next a suggestion that you make your own oils, third a summary of opinion from suppliers of bases and companies who mix their own, and finally a simple explanation of how Boeing has modified its carbide grinders to run wet and thus cut diamond-wheel costs. With the latter is a bibliography of earlier *AM* articles on grinding carbides. In addition to the many *AM* references to cutting fluids for particular materials, setups, or processes, these articles contribute general answers to your problem:

How to Cut Costs with Cutting Fluids—Sept 18 '50, p109-116
Cleaning Coolant for Grinders—Oct 2 '50, p94
Cupped Nut Distributes Coolant in Wheel—Dec 25 '50, p118
Vegetable Shortening Used Instead of Coolant—May 14 '51, p163
Straight Forming Licks Tough Nitralloy Job—Oct 15 '51, p133
Little High-Pressure Jets Cool Cutting Edges—Jan 21 '52, p281
CO_2 Cools Tools—Mar 3 '52, p129-132
How to Select a Cutting Fluid—Sept 1 '52, p118

F. S. Tangerman EXECUTIVE EDITOR



EMULSION RATIO can be checked by adding hydrochloric or muriatic acid to a sample of the oil to cause separation. Here 10cc of HCL added to a 200-cc sample shows a ratio of roughly 1 part oil to 4 parts water

WHAT YOU SHOULD KNOW ABOUT

Simple Cutting Fluids

BY R G MOYER
Research & Development Laboratories
PURE OIL COMPANY

Cutting fluids can affect tool life, surface finish, power consumption, cutting speed, distortion and dimensional accuracy, so you'd better know all you can about them . . . Here are pointers on the two commonest types

TABLE OF RECOMMENDATIONS

TYPE OF OPERATION	MACHINABILITY CLASSIFICATION (See table on next page for classifications) 1	2	3	4	5*	6*
Boring, Multiple-Head	C	C	C	C	E	E
Broaching	A	A	A or J	A or K	D	C
Drilling	E or D	E or C	E or B	E or A	E or D	E or D
Gear Hobbing & Generating	B	B	B	A	G or H	J or K
Grinding, Thread	A or B	A or B	A or B	A or B		
Grinding, Surface and Cylindrical	E	E	E	E	E	E
Milling	E, C or D	E, C or D	E, C or D	C or B	E, H to K	E, H to K
Reaming	D	C	B	A	F	G
Sawing	E	E	E	E	E	E
Screw-Machine Operations, Hand or Automatic	C or D	C or D	C or D	C or D	F	G
Tapping	A or B	A or B	A or B	A or B	H to K	H to K
Threading, Pipe	A or B	A or B	A or B	A or B	D or G	D or H
Threading, Plain	B or C	B or C	B or C	B or C	D or G	D or H
Turning, Boring, Planing or Shaping with Single-point tools	E	E	E	E	E	E

Key to Cutting-Fluid Symbols above:

A — Mineral oil plus sulfurized fatty oil

B — Mineral oil plus sulfurized-chlorinated fatty oil

C — Mineral oil plus sulfurized-chlorinated fatty oil

D — Chlorinated mineral oil

E — Soluble oil

F — Mineral lard oil

G — Mineral lard oil

H — Mineral lard oil

J — Mineral lard oil

K — Mineral lard oil

*See notes below relative to restrictions in the use of soluble and sulfurized cutting fluids when machining certain metals in these classifications.

**See notes for suggested emulsion ratios to use where soluble oil is recommended.

IN USING the table of recommendations, it is necessary to understand the machinability ratings used in classifying the metals into Groups 1, 2, 3, 4, 5, 6.

The term machinability refers to the relative ease with which a metal may be machined. A material with a low machinability can be machined efficiently by the proper selection of tools, speeds, feeds and depth of cut and by the use of the proper cutting fluid. The tools, speeds, feeds and depth of cut will be, for the most part, selected by the machine operator, but he will depend on the table of recommendations as a guide towards selection of the proper cutting fluid.

The term machinability rating used in the classification of metals is based on the machinability of SAE 1112 Bessemer Screw Stock steel as being 100%. For single point turning operations this represents a cutting speed of approximately 180 surface feet per minute at normal feeds and depths of cut. A material with a machinability rating of 150%, for instance, could be cut 50% higher speed or a proportional increase in depth of cut or feed. A material with a machinability rating of 50%, however, would require a cutting speed approximately 50% lower than that used on SAE 1112 or correspondingly smaller feeds and depths of cut.

In order to machine material efficiently with widely differing machinability ratings, it is necessary to provide different types of cutting fluids for each class of metal. The table of recommendations was designed to simplify the task of selecting the proper fluid for each class of metals and for the various machining operations.

The machining of zinc, Dow metal or magnesium and their alloys is usually done without cutting fluid but where cutting fluid is used, a mixture of equal parts of mineral lard oil and mineral seal oil is recommended. Under no circumstances should soluble oil emulsion be used.

Soluble oils and oils containing sulfur tend to discolor aluminum, copper and their alloys. These cutting fluids should therefore be recommended with caution for Monel, Everdur, brass, bronze and certain stainless metals where freedom from stain is important.

The emulsion ratio of soluble oil is determined by the severity of the operation and the ability of the metal and machine to resist corrosion. The table that follows will serve as a guide.

EMULSION RATIO 10-1	20-1	30-1	50-1
Boring	Boring	Drilling	Grinding
Drilling	Drilling	Milling	Sawing
Turning	Milling	Sawing	
	Turning	Turning	

In some special instances, the grinding of hardened steels and metals of low machinability is done with mineral oil plus sulfurized fatty oil or richer emulsions of soluble oil such as 10 to 1.

It must be remembered that the Table of Recommendations is intended to serve only as a general guide in the selection of a cutting fluid. Infinite variations in shop practice make it impossible to give more specific recommendations. The application must be governed by the peculiarities of the job or operation in question.

The two most familiar classes of liquid cutting fluids are straight cutting oils and oil-in-water emulsions. The former are primarily intended as lubricants with only mild cooling action, while the latter have much better cooling ability but are generally not as good lubricants.

STRAIGHT CUTTING OILS

Function—Several types of straight cutting oils are available for selection depending upon the severity of the operation, the type of metal to be cut, and the economic conditions. The accompanying table shows, in a general way, the various types of these fluids and their important properties. It should be noted that the primary function of a straight cutting oil is to prevent welding of the chips to the cutting tool this can be attained by a lubricating film, provided the temperature and pressure at the interface is not too high.

As severity of operation is increased, the fluid film cannot be maintained and welding tends to occur unless anti-weld agents such as sulfur or chlorine are present. These chemicals, if they are active at the cutting temperature, combine with

some of the metal at the chip-tool interface to form sulfide or chloride films which help to prevent welding.

The percentage of sulfur or chloride should not be used as a specification for comparing competitive cutting fluids. Actually, the composition and method of processing the fluid will determine the activity of the chemicals. If they are too active at low temperatures, poor performance with light or medium-severity operations may result; conversely, if they are not active enough at high temperatures, poor performance with high-severity operations may result. In addition, certain mineral oils occur in nature with a high percentage of inactive sulfur which is of little or no value for cutting operations.

Color—Some machine operators believe that the quality of a cutting oil can be measured by its color, the darker oils supposedly being better for heavy-duty operations. This is far from the truth. Dark-colored oils may be found which cover the range from very poor to very good cutting performance. At one time, all heavy-duty cutting oils were very dark, but with modern processing methods it is possible to manufacture heavy-duty oils which are quite transparent and relatively light in color. Transparency is advantageous in that the action of the tool may be observed while it is flooded with oil.

Odor—Odors in cutting oils frequently come from the fatty oil or the sulfur. Some oils containing high percentages of active sulfur undergo slight chemical action in storage. When a drum of this oil is opened after a long storage period, bad odors may be evident. If such a condition is expected, it is well to open the drum outside the shop and let it air out a few days before use. Perfumes are sometimes added to certain cutting oils to mask the other odors, but in these cases the cure may smell worse than the ailment.

Viscosity—The viscosity of a cutting oil is relatively unimportant, but it should not be light enough to cause excessive splashing nor so heavy that an appreciable amount is carried away with the work and chips.

Staining and Corrosion—Copper and most of the bronzes are readily stained by oils containing active sulfur. For that reason mixtures of mineral and fatty oils are usually recommended. The staining properties can be determined by heating a small quantity of the oil to the approximate operating temperature (150F) and immersing a piece of the metal for about ten minutes.

Some machine tools are equipped with copper tubing for distributing lubricating oil to the bearings. If cutting oils containing active sulfur come in contact with the bare copper, a black sulfide coating will be formed. This activity is normal but may reduce the sulfur content of the oil sufficiently to effect a change in performance. It would be well to keep such copper parts painted or otherwise protected.

Certain oils containing chlorine may cause corrosion of steel parts, particularly in the presence of moisture. It may be advisable to dip a piece of steel in the oil and hang it up to drain and for exposure to shop atmosphere overnight to observe the corrosivity.

Stability—Occasionally a cutting oil will be found on the market which will precipitate appreciable quantities of sludge deposits in the drum storage or

MACHINABILITY CLASSIFICATION

CLASS 1
Ferrous Metals
Above 70% Machinability

1016	1022	1110	1112
1120	4023	4027	4119

Malleable Iron, Steel Castings, Stainless Iron

CLASS 2
50% to 65% Machinability

1020	1040	1141	2317
3120	4042	4130	4640
5140	5150	8720	9440

Cast Iron

CLASS 3
40% to 50% Machinability

1008	1010	1050	1070
1320	1330	1335	1340
2330	2340	3115	

Ingot Iron, Wrought Iron, Stainless Steel 18-8 Free Machining.

CLASS 4
Below 40% Machinability

2515	3310	3141
9315	52100	

Ni - Resist, High - Speed Steel, Stainless Steel 18-8 Austenitic, Manganese Oil Hardening Steel

CLASS 5
Non-Ferrous
Above 100% Machinability
Manganese Alloys, Aluminum, Brass (Leaded), Zinc, Bronze, Red Brass

CLASS 6
Below 100% Machinability
Aluminum Bronze, Cast Copper, Everdur, Gun Metal, Nickel, Monel Metal, Inconel

SPINDLE SPEEDS FOR VARIOUS WORK DIAMETERS

	½"	1"	1¼"	1½"	1¾"	2"	2¼"	2½"	2¾"	3"
FPM	Rpm									
50	382	191	153	127	109	96	86	76	70	64
60	459	229	183	153	131	115	102	92	83	76
70	535	267	214	178	153	134	119	107	97	89
80	611	306	245	204	175	153	136	122	111	102
90	688	344	274	230	196	172	153	138	125	114
100	764	382	306	254	218	191	170	153	139	127
110	840	420	337	279	240	210	187	168	153	140
120	917	458	367	305	262	229	204	184	167	152
130	993	497	398	330	283	248	221	199	181	165
140	1070	535	428	356	305	267	238	213	195	178
150	1146	573	459	381	327	287	255	230	209	191
160	1222	611	490	406	349	306	272	245	222	203
170	1299	649	520	432	371	325	289	260	236	216
180	1375	688	551	457	392	344	306	275	250	228
190	1452	726	581	483	414	363	313	291	264	241
200	1528	764	612	509	436	382	340	306	278	254
210	1604	802	641	535	459	402	357	321	292	267
220	1681	840	672	560	481	421	374	336	306	279
230	1757	879	703	586	502	439	390	352	319	293
240	1833	917	733	611	524	458	407	367	333	306
250	1910	955	764	637	546	477	424	382	347	318
260	1986	993	794	662	567	497	441	397	361	331
270	2063	1031	825	688	589	516	458	413	375	344
280	2139	1070	856	713	611	535	475	428	389	357
290	2215	1108	886	738	633	554	492	443	403	369
300	2290	1145	916	764	655	572	508	458	416	382
310	2363	1183	946	789	676	581	526	473	430	395
320	2441	1222	976	814	698	610	542	489	444	407
330	2520	1260	1008	840	720	629	559	504	458	420

TYPES & PROPERTIES OF STRAIGHT CUTTING OILS

TYPE OF OIL	USE	PROPERTIES
Mineral Oil	very light severity	mild film strength
Mineral Oil & Fatty Oil	light to medium severity —particularly useful for copper and bronze	higher film strength than mineral oil
Mineral Oil & Sulfur Mineral Oil & Chlorine	light to medium severity	mild film-strength, mild anti-weld
Mineral Oil & Fatty Oil & Chlorine	medium severity	high film-strength mild anti-weld
Mineral Oil & Fatty Oil & Sulfur Mineral Oil & Fatty Oil & Chlorine & Sulfur	medium to high severity depending upon amount and activity of sulfur and chlorine	high film strength, medium to high anti-weld

Note: For a particular cutting oil containing anti-weld agents, the percentages of these ingredients may be reduced by dilution with mineral oil, resulting in an oil suitable for lower-severity operations than the original.

in the machine sump during use. To check this tendency, a bottle of the oil should be placed in storage for a period of 30 days, after this time the deposits can be observed by inverting the bottle. A small amount of deposit is not usually considered a disadvantage, but a layer of solid or semi-solid material ¼ in. or more thick is indicative of poor quality.

OIL-WATER EMULSIONS

Function—Oil-water emulsions or "soluble oils" are used for many operations in which cooling is an important factor. Water has approximately twice the capacity of oil for heat, but by itself is not a suitable cutting fluid because it has poor wetting ability and has a tendency to cause rusting of steel parts. Oil-water emulsions provide improved wetting ability and rust prevention while at the same time providing the cooling capacity of water.

A certain amount of lubrication is provided by the oil, depending somewhat upon the emulsion ratio (ratio of water to oil). Sulfur or chlorine are included as anti-weld agents in some formulations to form what are known as EP (extreme-pressure) soluble oils. All soluble-oil bases contain oil and an emulsifier, but some also contain germicides and water-treating materials.

Forming an Emulsion—It is common practice in many shops to form emulsions by adding water to a quantity of soluble-oil base. Although this method is usually satisfactory, occasions arise in which an inverse emulsion may be formed, identifiable by oily masses floating on top of water. The correct procedure is to add the soluble-oil base to the water so an emulsion will be more easily formed.

It is generally more difficult to form emulsions with hard water than soft and with cold water rather than warm. When you consider the purchase of a soluble oil, it is advisable to try a small amount in the water to be used, to determine whether a satisfactory emulsion can be formed. The oil should be poured into the water, mixed thoroughly, and allowed to stand for at least two hours. At the end of that time, an appreciable separation of oil at the top of the emulsion is an indication of unsuitability.

Checking Emulsion Ratio for Used Soluble Oil—During use, water frequently evaporates from soluble-oil emulsions, making a water addition necessary. Many machinists are able to make a fair estimate of the emulsion ratio by "feeling the oil". However, when large quantities of oil are involved, it is usually better to cause separation of a sample of the emulsion so the ratio can be observed visibly. Such separation is quite simple and may be accomplished thus:

1. Measure out 200 cc of emulsion into a 250-cc graduated glass cylinder, page 154.
2. Pour about 10 cc of concentrated hydrochloric or muriatic acid into the emulsion and stir with a glass rod.
3. When sufficient acid has been added, the oil will begin to float to the top. Permit the sample to stand for a short time until all of the oil has separated.
4. Observe the amount of oil present and subtract this amount from 200 cc to find the quantity of water present in the emulsion. By simple calculation the correct addition of water can be determined.

Contamination—Most soluble oils will tolerate a small amount of oil which may drip from machine bearings, but if an appreciable amount of oil is added it will float to the top or be suspended as droplets in the emulsion. As lubricating oils do not have the same coolant properties as soluble-oil emulsions, it is advisable to avoid this contamination as much as possible.

Needless to say, every reasonable precaution should be taken to eliminate contamination by non-hygienic materials. Workers should not wash their hands in cutting-oil emulsions. Another possible source of contamination occurs when bar stock is brought directly to a machine tool from outside storage. In this case, the cutting oil will tend to pick up some of the dust and dirt that may have accumulated on the bar stock.

Selection—By and large, selection of the best cutting oil for any given application has not yet been reduced to an exact science. As I have pointed out, many variables tend to affect performance under actual shop conditions. Several suppliers have available for the asking, however, cutting oil-recommendation charts such as the one shown here which will aid users in confining the applications of all types of oils to the general area of work for which they are best suited.

Why not make your own

Money can be saved by buying mineral oil and bases and blending your own cutting oil. Here's how—and why—it's done . . .

The purchase of cutting oil by most industrial plants usually entails the procurement of some brand-name product sold by a reputable oil company. Unless you happen to be one of very few exceptions, you have little, if any, information about the composition of the fluid other than perhaps the vague fact that it is a sulfur- or a lard-base oil. Chances are that the principal reason the product now in service for a particular machining operation has been selected is because it has given better results than a competitive material.

In large plants, it is not uncommon to find fifteen or more cutting oils specified as necessary to produce the work required. A basic understanding of the composition of cutting oils will show that no more than three cutting oils are generally required in any plant and that an excessive number represents duplicate buying of similar formulations sold under different brand names. I'd like here to take some of the mystery out of cutting-oil compositions and to show that by maintaining a stock of a cutting-oil base and mineral oil, you can very simply and economically make it yourself.

A cutting oil is a blend of a small amount of suitable "base" in mineral oil. The base is a material containing oiliness and extreme-pressure compounds, including sulfur, fat, and often chlorine. Under the conditions of high pressure and temperature that exist between the cutting tool and the work, the base forms a protective film on the metallic surfaces, thereby minimizing seizure, friction and wear. It is the quality and quantity of the base that is largely responsible for the efficiency of the cutting oil. The mineral oil acts merely as a carrier for the base and assists by dissipating the heat and in carrying away the chips.

components of cutting oils

Mineral oil is obtained by distillation of crude petroleum. Viscosity of the mineral oil used for making cutting oil is usually about SAE 10. There are no special quality requirements necesasry for the mineral oil inasmuch as there is no need for the advantages in chemical stability and minimum viscosity-temperature change offered by high-grade oils.

Bases are commonly manufactured by sulfurization of fats. This is done by chemically reacting flowers of sulfur (a yellow powder) with a fat (commonly lard oil) at an elevated temperature. Sulfurized-fat bases contain approximately 10 to 18% of sulfur chemically combined with the fats selected. It is to be noted that sulfur in this form remains uniformly dispersed in cutting oil and does not separate.

Where chlorine is desired in the base, the fat may be reacted with sulfur-chlorine-containing chemical (instead of straight sulfur). In some cases, a chlorinated compound may be added to the sulfurized fat as another component of the base.

Most cutting oils are "sulfur-base" oils because sulfur is one of the best and least expensive of the anti-weld materials known. When you buy a sulfur-base oil you are in effect buying an oil that has a certain amount of sulfur added to it. Obviously, this amount is not standard and will vary very substantially between brands. Furthermore, the designation "sulfur-base" does not give any information with respect to other additives that may be present.

In a number of applications, such as in the manufacture of certain electronic parts, neither sulfur nor chlorine are permitted in the cutting oil. The base in these cases generally consists of a fatty material or fat derivative.

grade of cutting oils

While cutting oils are not sold on a "grade" basis, they may be divided into two principal categories: general-purpose products, and heavy-duty products. A general-purpose cutting oil is prepared by blending approximately 1 to 5% of base in mineral oil. Such an oil is suitable for use on free-machining stocks, SAE 1100 and 1300 series, cold- and hot-rolled low-carbon steel and the common non-ferrous metals, copper, brass, and aluminum.

A heavy-duty cutting oil is prepared by blending approximately 5 to 15% of base in mineral oil. Such an oil is suitable for use on tough-to-machine metals such as stainless, alloy steels, high-carbon steels, monel, and beryllium copper.

Inasmuch as the cost of the base is substantially higher than the cost of mineral oil, cutting-oil quality and price are generally directly related to the base content. Proper selection of the quality needed requires consideration of such factors as tool life, surface finish, accuracy of cut, and speed of production. In any event, no more than three cutting oils should be necessary, these products differing in either base content or quality of the base (corrosive or non-corrosive).

With respect to the quality of the bases, there are a number of possible differences. "Corrosive"-type

cutting oil?

FOR MAKER AND USER OPINIONS . . . turn page

BY LEON SALZ, Manager, Lubricants Division,
MAGNUS CHEMICAL COMPANY, INC.
GARWOOD, NJ

bases (those that stain copper and its alloys) are more efficient than "non-corrosive" types. This is because the sulfur in corrosive bases is more readily released under conditions of extreme pressure and elevated temperature than in the non-corrosive varieties. Accordingly, the corrosive-type base is most desirable for difficult-to-machine metals but stains copper and brass. If an oil is desired for use on both the lubricating and cutting-oil systems of the machine (dual-purpose oil), a non-corrosive-base cutting oil is necessary.

how to make your own cutting oil

Cutting oil can be made quite simply by adding an appropriate amount of base to mineral oil. The base may be purchased from a number of chemical or oil-specialty compaines. The mineral oil is obtainable from any oil refinery. For general use, a material known to the trade as "100-second paraffin oil" is recommended for the mineral oil. This has a viscosity somewhat lighter than SAE 10. Typical formulations are:

General-purpose cutting oil: 1 gal. cutting-oil base*; 35 gal. 100-sec paraffin oil

Heavy-duty cutting oil: 3 gal. cutting-oil base*; 35 gal. 100-sec paraffin oil.

The base chosen may be of the corrosive or non-corrosive type, the latter being recommended if staining of copper or brass is to be avoided. Furthermore, the base selected should be fluid and suitable for rapid blending in mineral oil at room temperature. This point is important for ease of handling.

With a fluid-grade base, less than a minute will be required for the pump of the machine to mix the components. The blending may also be accomplished in a two-bung 55-gal. drum, central circulating system, or storage tank by using an air hose for agitation. No special equipment is required.

advantages of making your own cutting oil

Most everyone is interested in reducing production cost. A brief look at some cost calculations will show the desirability of making your own cutting oil.

The current range in cost for the purchase of single-drum quantities of general-purpose cutting oil is approximately 43 to 65¢ per gal., plus 6¢ per gallon Federal tax. The cost of 100-sec paraffin oil (mineral oil) is 28¢ per gal., plus tax. Considering the cost of base at $3 a gallon, it would cost 3¢ per gallon for each percent of base added to mineral oil. Accordingly, the raw-material cost for making your own general-purpose cutting oil (1 to 5% base content) would be in the range of 31 to 43¢ per gallon. This would represent a saving of at least 12¢ per gallon, or $6.60 per drum. Multiply this figure by the number of drums you buy per year. Does it look impressive? With heavy-duty cutting-oil prices starting at about 60¢ per gallon, even greater savings can be effected.

For those plants who use a drum or more of cutting oil per week, the savings may even be greater. With that volume, it would be worth your while to install a 1000-gal. storage tank and purchase tank-wagon quantities of 100-sec paraffin oil at approximately 17¢ per gallon. **Now you can make cutting oil starting at 20¢ per gallon!**

Another benefit in making your own cutting oil and in having a base on hand is the great degree of flexibility it provides. For example, if a run has just been completed on a free-machining stock and the next run calls for a tough alloy, there is no need to drain the sump and change oils. Simply "build up" the oil in service with some more base. Having a base available saves time and money.

LEON SALZ was graduated in 1940 from NYU with a degree of BS in Chemistry and from the University of Michigan in 1941 with an MS in Chemistry, after which he took specialized training at the Polytechnic Institute of Brooklyn in lubricants. After two years with Crane Packing Co, Chicago, he went with the Socony-Vacuum Laboratories in Brooklyn, becoming a senior chemist on cutting and drawing oil formulations. In 1950 he joined Magnus Chemical Company and was shortly thereafter elevated to his present post. He holds a number of lubricant patents and has written several technical articles on the subject (ie, AM—Nov 12, 51, "Choose Your Metal Cutting Fluids with Care"). Mr Salz is a member of the American Society of Lubrication Engineers, The Wire Association and The American Chemical Society.

*The formulation is calculated to assume the base is 100% active material (sulfur, fat, or chlorine) and contains no mineral oil. A number of "bases" or "concentrates" contain 50% or more of mineral oil. This information should be obtained from the supplier and the formula adjusted accordingly.

Here's a summary of maker

Mixing your own cutting oils is simple, or complex, depending upon the fluids you use and the quantities, the available equipment and the men.

BY E J TANGERMAN, EXECUTIVE EDITOR

TIMES HAVE CHANGED— with cutting fluids as with everything else. Time was when lard was rendered at home, when beans were made in a pot, when a cigarette took skill to roll, when a suit or pair of shoes was made to order—when you started with ingredients and produced the mix. But now food, clothes, and medicines come ready made. We pay more for them, but save time and trouble. The specialist does the job for us.

Somewhat the same thing has happened to cutting fluids. We once had only spindle oil, kerosene, and a doubtful all-purpose soluble-oil mix. Now we have dozens, from powders to gases, from additives for water to high-EP oils. There are so many types (and brand names), in fact, that it is confusing to shopmen.

It should be realized at the outset that we are discussing here NOT soluble oils, but straight mineral-oil and base blends of the type used in screw machines and automatics. The ultra-thin fluids used in broaching and the high-oiliness fluids for trick alloys are specialties, and require the knowledge of a specialist, as well as different bases and diluents. But these ARE special situations, as Mr Salz implies, and do not make up the great bulk of cutting-oil requirements.

Practically all common oils are used as bought. There are no tricks and no complications. Most shops are thankful it is so—they're content to trust the specialist.

But not all! Some shops have unusual materials to machine, some are more cost-minded. To these, Mr Salz is suggesting that they mix their own to size and avoid the "canned" product. Because Mr Salz' proposal represents an unusual idea in preparation of cutting fluids and one that will come as a surprise to many readers, we felt it advisable to do some checking into the idea. We have talked with a number of oil or base suppliers and with several metalworking companies which mix, or have mixed, their own cutting fluids and find a variety of opinion and many valuable suggestions.

the makers say...

Many major oil companies, and most cutting-fluid specialists, sell bases to customers desiring them, and major oil companies of course sell mineral oil in quantity. But most are cautious about recommending the practice, not because of monetary considerations primarily, but because of such factors as these:

1. Greatest danger is that operators will make their own mixes, varying mix in every batch and criticizing constituents when results vary or decline. Some suppliers feel quite strongly that risk to their reputation is too great unless they blend the fluids under laboratory control of temperature and constituents.

2. Variation in mix means corresponding variation in cost, so the customer may suddenly find this home-blended oil is costing much more than he thought. Each foreman—and in fact each operator—is likely to reason that if a given amount of base works well, then twice as much would work better. That pushes cost up correspondingly, but also may result in lowered fluid efficiency and detrimental effects on work, machine or operator.

3. Every foreman and every operator is likely to evolve a pet formula and insist upon its use, resulting in a dozen mixes in a single department and obvious nuisance and undesirable complication.

4. SAE 10 may not be the proper viscosity for the mineral oil. Suppliers feel that higher viscosities may be needed on some jobs to increase oiliness.

Generally speaking, oil suppliers prefer to limit sales of cutting-fluid constituents—rather than mixed oils—to large companies where they can be assured mixing will be done at a central laboratory under controlled conditions and to standard formulas which will not vary from batch to batch or to suit a shopman's whim. At least one large supplier has his local representative stop in frequently at such mixing rooms to pick up samples for analysis in the supplier's laboratory, to see if the blend is on the mark, or has been allowed to slide to an undesirable mixture.

It should not be implied that all large metalwork-

and user opinions...

To supplement Mr Salz's article, we surveyed a number of suppliers of bases and metalworking companies who do their own mixing. Here is a digest of their ideas . . .

ing companies mix all their requirements. Some mix none, many mix only special cutting fluids. These latter might be, for example, high-EP types in which sulfur, chlorine or other materials are added to strengthen a regular mix for a special job. They allow no operator or handyman mixing to fancied preference, because untrained men are too likely to believe a double dose of base will work twice as well, with the same result as the patient who tries a double dose of powerful drug.

For some kinds of fluids, temperature, rate and method of mixing, and other factors are important in mixing, but the user is not likely to think so. Remember the old church-bazaar cake-baking contest in which all contestants were to start with the same ingredients? Remember how many different textures and tastes of cake came out of it?

OPINION VARIES

Here, again, opinion is not uniform. At least one supplier of bases (to compounders of cutting fluids as well as to users) feels no special equipment or laboratory-controlled procedures are needed. The additive is simply added slowly to the drum of oil while the latter is stirred, or clean oil is put into the cleaned sump of the machine tool and circulated with the coolant pump while a measured amount of additive is poured in slowly. Such mixing is done either with straight mineral oil or into low-cost cutting oil being beefed up for a difficult job. He agrees that proportions must be observed, but feels they are not "laboratory critical."

This same supplier feels that 90% of machining operations on alloy steels and stainless, as well as most non-ferrous metals, can be performed with mineral oil to which has been added 1 to 1½% of additive and about as much lard oil (The exceptions are bronze alloys and soft low-carbon steels). Such a procedure brings the cost of the cutting oil to 5 or 6 cents a gallon over the cost of the mineral oil used.

Another company, selling bases and blends of bases (but no oils) all over the US and to foreign plants, has this to say:

"If a metalworking company is equipped to do its own blending, then it is to its advantage to purchase bases and blending oil separately and blend in its own plant. If properly set up, the plant can do its own blending at a lower applied cost and obtain greater flexibility inasmuch as the plant can vary the blend for specific operations.

"Although we are manufacturers and not "blenders," we still supply blends of our bases to a small number of customers who are either not set up to blend or do not want to be "bothered" with blending. Naturally, in such cases, their over-all cost picture is higher. Because we have to include the extra handling operation, and the purchaser in effect pays transportation on the oil diluent, the final charge is greater than if the customer purchased the base from us and the diluent oil from a refiner in his area and did the blending himself.

"The major drawbacks, or pitfalls, in blending by a metalworking company is that many are not equipped to do so efficiently, or those that are properly equipped do not blend properly. In such cases, it is not unlikely to obtain an improper ratio of base to oil, mix poorly, or use the wrong diluent oil. Quite often in such cases it has been our experience that a higher concentration of base product is employed than is actually necessary. This is particularly true for those plants that do not have a skilled person responsible for the blending, but allow any number of operators to have access to the bases and diluent oils and do their own blending. This, of course, is more often the case with small companies than with large ones.

SINGLE RESPONSIBILITY

"A very large number of companies who purchase our bases have what we consider an optimum setup for blending. These plants will have one person responsible for the preparation of all blends. These persons are skilled and in many plants are familiar with the types of bases employed and the operations on which they are used. They have proper mixing equipment, storage tanks, and measuring devices whereby the proper blends may be prepared and a constant ratio of base to diluent oil is maintained where necessary. For special operations, special mixes are prepared.

"In some of the more elaborately set-up blending systems, the man responsible for blending also takes care of the recovery systems, whether a central supply system is involved or an individual-machine system. These companies will have settling tanks, and the used blend is then filtered and/or centrifuged, followed by control checks of the active con-

tent and additions of the base or diluent oil if required.

"While recovery systems and elaborate equipment are not absolutely necessary for a metalworking plant to do its own blending, we do feel that is most important and necessary to have a responsible person do all of the blending rather than have all bases and diluent oils available to each operator and for his own mixing.

"Over-all, the trend has been for the larger companies to equip themselves and do their own blending. While many smaller companies do likewise, the trend is at a slower rate with them than with the large companies.

"One point which may be overlooked is that the sale of bases can present a sort of educational problem inasmuch as a purchasing department may be misled by the price of a base as compared to the price of a blend. Explanation by the vendor can handle this 'problem'."

A supplier of additives for water solutions for cooling adds this:

"Have found lately that Chrysler has been resorting to making its own soluble oil. For some time, Tom Badger of Westinghouse in East Pittsburgh has been using waste hydraulic and lubricating oils for making soluble oils. For many years, O A Moag of Timken in Canton, Ohio, has been making his own soluble oils. The same is true of Ford Motor Company. While it probably pays the large users to indulge in such practices, I doubt if the small users would find the savings worth the bother."

the users say...

Curtiss-Wright mixes all its own, using a base to produce more than 20 different blends, each given its own company number to suit the job. All blending is done in a large oil house with proper equipment and under careful supervision. A straight paraffin oil is purchased cheaply in tank-car lots and the base mixed with it, thus saving the cost of blending, drumming, and higher freight. This company also reclaims cutting oil and reblends it, as well as mixing its own lube oils both for machines and engines.

International Harvester has several plants mixing their own oils, mostly for gear hobbing and screw-machine operations. Other jobs are done with ready-mixed oils, soluble oil, or water with proprietary additives. Savings are claimed substantial, plus improvement in tool life and surface finish.

One large electrical manufacturer has mixed its own fluids for years, but the key factor was the fact that it had a surplus of mineral oil available. Under those conditions (mineral oil available at low cost), cost of the mix several years ago was about half that of purchased blended oil. Now, however, the new commercial additives for water (both solutions and emulsions) are considered "utterly superior"—probably because surface speeds have recently increased substantially.

The lubrication engineer of another electrical-equipment plant is advocating mixing of the company's own cutting fluids in all plants. He, incidentally, uses old lube oil as base for cutting fluids because oxidized elements in used lubes give oiliness properties he wants. You may also recall that Chevrolet-Muncie uses reclaimed lubricating oils in catch-as-catch-can mixtures for gear-hobber cuttin oils (*AM*—Mar. 19 '51, p137).

A CASE STUDY

Apparently, a number of companies with batteries of automatics or screw machines mix their own cutting fluids. One is Hartford Machine Screw Co, Inc. Here are extracts from a letter from Augustus D Rose, factory manager:

"We are a job shop handling all types of products produced from bar of 1/64- to 5-in. diameter, and including finishing operations of all types. Perhaps more than most people, we are confronted with a great many types of material, both ferrous and nonferrous, including the stainless types and alloys. To have a ready-mixed oil for all the different applications that we need would require a rather large storehouse. We try to confine our cutting oils to as few types as possible and purchase from as few suppliers as possible. Our major suppliers are two of the best that we know of, and we find that they can furnish us with almost any oil that we want.

"For instance, if a salesman comes in and wants us to try a certain type of oil, we are always willing to experiment. If the oil shows up well, we then analyze it and see what it is made up of, and then we usually find the same thing is available from the company with which we are already doing business and in which we have confidence.

"We certainly have a lot of respect for salesmen, because through salesmen we make a great many of our improvements in operations, including licking many problems with oils. However, we have seen many cases such as this one:

"A salesman convinces us we should experiment with his oil. We decide to try it on a certain long-run job on which we have had good past experience to compare with. A salesman, in many cases, likes to stay with the experiment and will sometimes spend from a day to four or five days on the job, so we clean the machine, put the new oil in, and start it up. First thing that happens is the comparison of the last pieces made with the old oil with the first pieces made with the new oil, in many cases, shows superior finishes.

"Various individuals in our organization, such as the factory manager, superintendent, general foremen, and foremen from other departments, as well as the departmental foreman, are interested to see how the experiment is working out and come by from time to time. Some of these individuals will see improvements that can be made—a tool ground a little differently, another tool substituted, etc. Someone will suggest speeding up the machine. This sort of thing goes on for days. In the end, we probably have a better-running job with longer tool life at a much faster cycle time and a better finish on the part.

"The salesman then, as will be natural, says, 'This is what my oil can do. Let's put it in all the machines.' Our reaction to this is, 'Let's try one more thing. Let's take a new batch of the oil we *were* using and put it in the machine as it is today to see what happens.' Probably in 75% of these cases, we find that the original oil will give us the same results.

"Let's see why this is: In the first place, why shouldn't we get a better finish on the parts when we put new clean oil into a machine? In the second place, this machine, over a period of several days, has had the attention of most of the top brains in the organization and has been looked at with a critical eye not only as regards the oil problem, but also as to the exact sequence of operations, tooling, and all the other things that go into making a job a good job. I don't believe that any test with a new oil is complete until the new oil had been taken out and a fresh supply of the original oil has been tried to see for sure whether or not it is the *oil* that has made the improvement."

"You can imagine that a company would have to be fairly large in order to have our system pay off, because there is considerable equipment needed to establish the system. We have large storage tanks in the ground in which we maintain our inventory of mineral oil as well as other types. Our base oils we usually buy in drums, and this is mixed with the mineral oil to give us what we call our "general-purpose" oil or system oil. This is stored in tanks and is piped to various parts of the factory. We also have 275-gallon tanks mounted on wheels which are used for many departments.

"As the oil is used, we may add to this system oil a little more base on certain jobs where we find it is needed to give us a richer mixture. On some jobs (perhaps 1%) we use a special oil developed especially for that job.

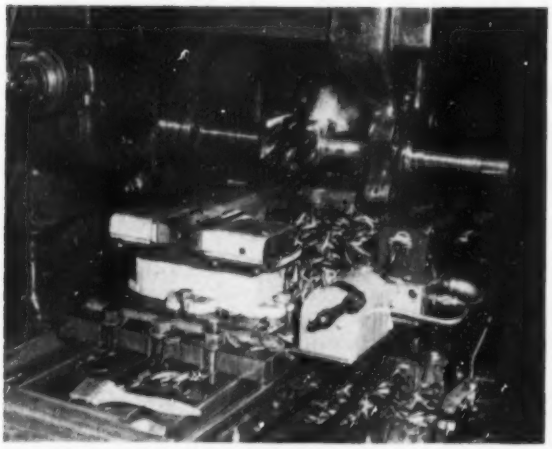
"All of the oil which goes through our chip-disposal unit on the chips is collected from the centrifuges, put through a filter system, then sterilized. From there, it goes back to the central storage tank and, of course, is diluted or enriched according to the types of jobs it has been used on.

"We sample our central storage tank occasionally and make additions either of base or mineral oil to bring the consistency back to what we consider our general-purpose oil should be. As we run most brass and aluminum jobs with straight mineral oil and as this mineral oil goes back into the system through the chips, usually our system oil has to have base oil added to it continually to keep it up to a good consistency for most steel jobs. In fact, occasionally we are cutting so much brass and aluminum that we stop issuing straight mineral and paraffin oil for these jobs and use system oil so that we do not get an over-supply in our system and have to store it in drums. About the only exceptions to this would be very unusual jobs and our centerless-grinding equipment and, of course, on any equipment which uses soluble oil. We do not reclaim soluble oil at all.

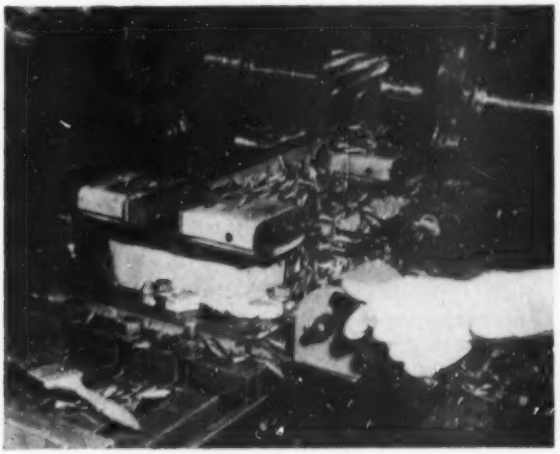
"Savings in cost on a per-gallon basis could probably be easily computed compared with cost of prepared bases, but we believe that the major saving is in the *system* that we have and it would be rather difficult to establish savings figures on this."

CLAMP KEEPS PACE WITH HIGH-SPEED MACHINING

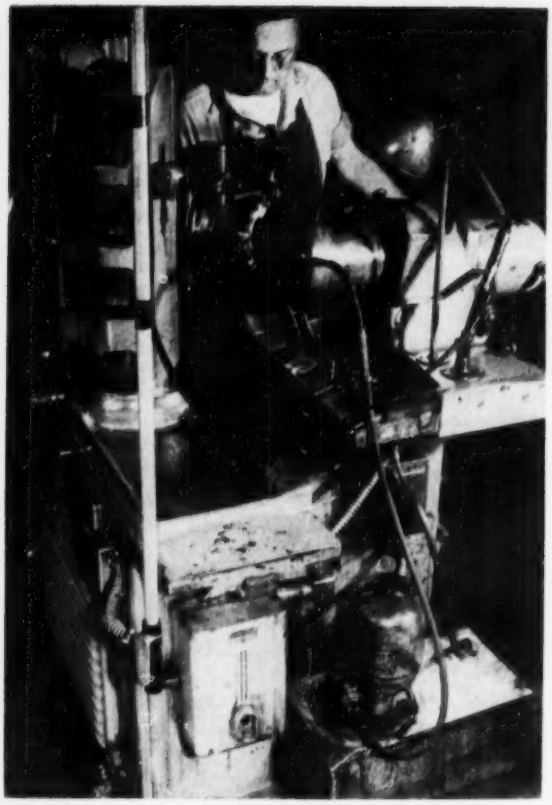
BY RICHARD F THUMA,
ALLIS-CHALMERS MFG CO



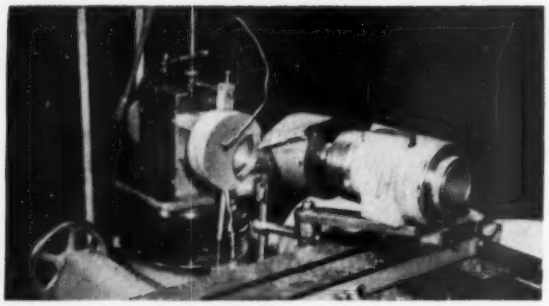
SLAB MILLING IS DONE AT HIGH SPEED with sulfurized-oil coolant. Cut is made by climb-milling. Material is corrosion-resistant steel, and is cut to blank shape for steam-turbine blade. Magnetic chuck and vises are bolted to common baseplate. Switch interconnects controls. New setup has eliminated soft hammer, wrenches, and has cut operator effort. Down time was cut 30%



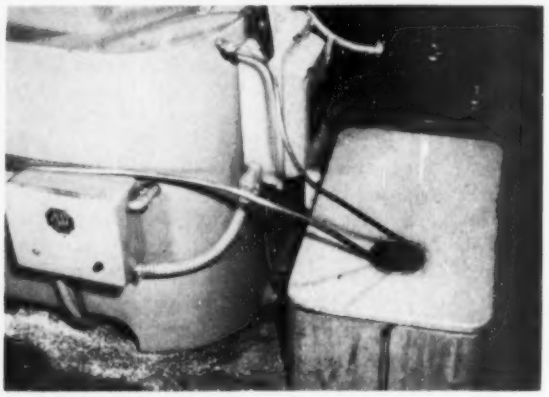
MAGNETIC TABLE AND TWO AIR VISES are all operated by drum switch at front of horizontal miller. Magnetic fields pulls down work rapidly; time delay in operation of solenoid valve that controls air to vises is enough to let work seat itself before jaws are tightened. Only other operations by hand are cleaning off chips with brush, removing work after cut is made



CONVERSION of Kearney & Trecker cutter grinder for wet grinding included mounting guard around wheel and positioning drain pan below normal grinding position. Synthetic rubber tubes connect machine to sump tank on floor. Guard is adjustable



GUARD AROUND WHEEL on this No. 2 Cincinnati tool and cutter grinder is typical of conversions of such machines for wet-sharpening carbide tools with diamond wheels. Cap on guard is cut away to clear wheel where it contacts tool edge



IMPROVED SUMP TANK developed for the No. 2 Cincinnati grinder has screen through which coolant from two return lines is drained. At intervals, old coolant is pumped to settling tank. Settlings, and sludge from sump, are processed to reclaim diamond particles

WHY BOEING WETS DIAMOND WHEELS

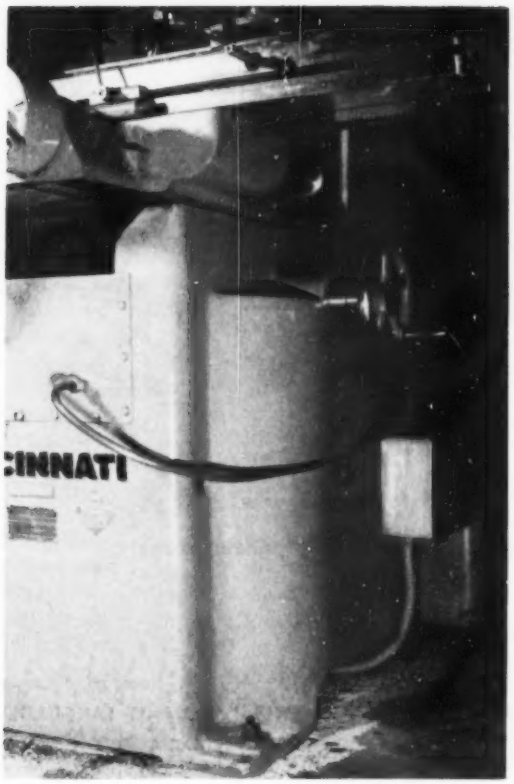
Coolant systems added to conventional tool grinders permit faster grinding of milling cutters, multiply wheel life as much as eight times

BY KENNETH LOWTHER, Superintendent, and S L HARGROVE, Assistant Superintendent, Tool Central Section, WICHITA DIVISION, BOEING AIRPLANE COMPANY

Wet sharpening of carbide milling cutters with diamond wheels, using a conventional soluble oil-and-water coolant, has made possible substantial savings at the Wichita Division plant of Boeing Airplane Co. Use of the coolant has increased the average life of diamond wheels an estimated six times, has provided a convenient method for recovering diamond chips lost from the wheels during grinding passes, and has made possible more rapid sharpening of the cutters.

Several types of conventional tool and cutter grinders have been converted for wet grinding by the Wichita Division. These include an Ingersoll tub grinder and a K O Lee chip-breaker grinder, as well as the Cincinnati No. 2 tool and cutter grinder and the Kearney & Trecker cutter grinder shown. In addition, several cutter grinders with built-in coolant systems are employed.

The coolant-circulating system used for all converted grinders is basically the same in each case—it employs a ¼-hp direct-drive vertical coolant pump mounted on a steel sump tank that is positioned on the floor beside the grinder.



CONVERSION of Cincinnati No. 2 tool and cutter grinder for use of soluble-oil coolant includes closing opening in machine base under table saddle with gasketed steel plate, and providing hose to drain coolant from sump cavity thus formed. Sump tank is behind machine

Flexible synthetic-rubber hose lines and copper tubes connect the pump and sump tank with the machine.

In each case the grinding wheel is enclosed with a steel guard which supports the copper coolant-supply tube so the fluid is directed properly against the wheel. It also serves to confine coolant spray thrown off by the rotating wheel. For grinders used to sharpen milling cutters, the outer side of the guard is a removable cap with about a quarter-circle opening for access of the cup wheel to the work. Position of the opening can be changed to suit various jobs.

Coolant drained from the grinding position is caught on surfaces of the grinders that have been converted into coolant-return passages by adding steel plates and gaskets to the open areas. Slanted holes have been drilled in the lower portions of these coolant-return passages, and copper tubes inserted to drain the fluid back to the sump tank through flexible hose lines. Each system contains about 10 gal of coolant.

Tool-grinding specialists have found that the depth of cut per pass of the grinding wheel can be increased materially when using coolant with diamond wheels for sharpening carbide tools. Normal depth of cut when grinding dry was 0.0005 in. per pass. With traverse speed slowed, and coolant flowing freely, cut depth generally can be increased to 0.015 to 0.020 in.

Data show that during a six-month period of dry grinding, some $23,000 worth of diamond wheels were used. In the "wet era," the tool-grinding section has sharpened eight times the volume of carbide tools in the same length of time, but the diamond wheel cost was only $28,000.

Development of wet-grinding procedures was accompanied by a program for reclaiming diamond chips from grinding sludge, the installation of a system for keeping detailed records on wheel performance, and institution of procedures for controlling the quality of incoming wheels.

As a result, Wichita has been able to reduce sharply requirements for a supply of wheels of varied grit size specifications. Previously, the tool-grinding section used wheels ranging from 320 to 120 grit; now it is possible to use 180-grit wheels for almost all jobs. Operating speed of the grinders remains at 5,000 to 6,000 sfpm.

Carbide tool sharpening is a major problem, because the company has found carbide-tipped tools to be well adapted to the precision demands of making parts for the B-47 *Stratojet* bomber. Hundreds of carbide blanks are purchased for a wide range of machining operations. Principal applications are shell-type face mills, helical cutters for Farnham spar mills, single-point and forming tools.

OTHER RESEARCH

In addition to diamond conservation studies, Boeing recently has been directing carbide research along three main lines: (1) new methods for twisting carbides for tipping helical cutters, (2) standardization of carbide tool design, and (3) new developments in tip-brazing methods. Improvements resulting from these studies have been an important factor in minimizing manufacturing costs.

FOR FURTHER INFORMATION ON DIAMOND CONSERVATION:

How To Conserve Diamond Wheels, *AM*—Feb 18, 52, p173
Arc Machining Makes Hard-to-Cut Jobs Easy, *AM*—Mar 3, 52, p136
New Processes Will Machine the Unmachinable, *AM*—Mar 17, 52, p130
Soft Steel and Ultrasonics Machine Carbide, *AM*—Sept 15, 52, p141
Why and How We Must Conserve Diamond Bort, *AM*—Nov 10, 52, p151
Electrolytic Grinding, *AM*—Nov 10, 52, p154
CO_2 Cools Carbide Grinders, *AM*—Dec 8, 52, p97
Abrasive Belts Grind Carbide, *AM*—Dec 8, 52, p103
No Cause to Worry Over Diamond Bort, *AM*—Feb 2, 53, p145
Economic Factors Must Govern Wheel Selection, *AM*, Feb 16, 53, p165
Cadillac Teams CO_2 With Silicon Carbides to Grind Carbides, *AM*, Feb 16, 53, p172
Diamond Dilemma, *AM*, Mar 2, 53, p141
Carbides Ground Without a Diamond Wheel, *AM*, Mar 16, 53, p195

Cost analysis aids Douglas foreman

A two-week stint in the Cost Analysis Department gives Douglas foremen a new slant on methods, time study, and problems of labor productivity. Here's how the program works

By H M COVERDALE Production Cost Coordinator DOUGLAS AIRCRAFT COMPANY

THE job of fabricating thousands of aircraft parts, each to different manufacturing specifications, and assembling those parts into a modern commercial aircraft is a teamwork operation. The right part must be at the right place at the right time. And, if planes are to provide minimum cost per passenger mile, parts also must be produced at the right cost. Herein is the first common ground between production foremen and production cost analysts.

GIVES A NEW PERSPECTIVE

Many people believe that foremen are born to their profession. This may well be true. But it stands to reason that the opportunity for foremen to view the job from a different perspective is a welcome change and is a real advantage in the execution of their responsibilities. This is especially true when the perspective presented is that which is of prime interest to their project superintendent. And so, as part of Douglas policy in Santa Monica, foremen and production cost analysts get together. For two weeks, the foreman of one project works with the cost analysts of a different project. While this period is short, Douglas has found the program to be of definite benefit to both the foremen and the analysts.

To see how foremen benefit, consider first of all what a cost analyst is. Usually, he's an individual who came up the hard way and is now a junior member of the production management team. He could have started as a burring operator, made good on a chance to run a punch press, then successively has run radial drills and routers, or operated a power brake.

Alternatively, he may have been a man that rose from the subassembly benches to become an airframe mechanic. But one day he transferred to Time Study and began his stop-watch apprenticeship. Soon he began setting standards on the jobs he formerly did, with a full realization of the requirements of the job and the best way to turn out acceptable work.

Next he became responsible for the job standards of an entire department and for the production performance reports of the department. Cost Analyst stature came shortly after. He now was qualified to command the respect of the men in the shop and to work with them. In short, a cost analyst is a man who knows what acceptable shop performance is, and is able to assist shop foremen to maintain high labor productivity.

TALKS THE FOREMAN'S LANGUAGE

When a foreman begins to work in a Cost Analysis group, he's usually with old acquaintances, ready to talk his language, with the accent on productivity.

The foreman usually starts with the Production Cost Supervisor who outlines the basic management requirements, the reasons for these requirements as they relate to the over-all business, and the generalized techniques which meet these requirements throughout the plant. The importance of maintaining a high level of productivity at any point in the process of manufacture is discussed.

INDIVIDUAL PROGRAM

The foreman's individual program then is worked out to best fit his particular needs as a man responsible for a specific production function. Usually the program includes visits with cost analysis groups on Fabrication, Sub-Assembly, and Installation projects. This gives the foreman a clear understanding of different techniques used. The program concludes with short assignments in the statistical groups that publish production reports, compare rates of manufacture with production schedules, and balance labor loading.

AIMS AT HIGH PRODUCTION

The foreman's visits to the various cost-analysis groups follow a similar pattern. Basic concepts on the purpose of foremen and cost analysts are gone over thoroughly. Executionary and confirmatory functions are defined and shown as necessary to the successful operation of the business. The common job that has to be accomplished is considered and, suddenly, it's quite apparent that although the problems individually encountered on a daily basis are totally different, the objectives of the shop foreman and the cost analyst are identical—to keep the shop running at its best possible productive level. It becomes very clear that "cost consciousness" and "directed shop supervision" can unite into a winning combination that completes like an ace and a ten spot around a jack, queen, and king.

HOW IT WORKS

"What a performance report is" is clarified and reduced to its bare essentials in generalities that fit all departments. How the production standards are developed in a manner which is fair to management and to the shop personnel is discussed and explained thoroughly.

Soon the foreman visits the cost analysts of each individual department, in the shop and at the analyst's desk. Their conversations drift into feeds and speeds, stretch-form blocks and extent of stretch, drop hammers versus draw presses, and the application of standards to the parts produced. Shortly after, the foreman begins to draw from his past experience and past problems and comes up with "What'd you do in a case like this?" And the air becomes electric with candid opinions.

UNCOVERS BETTER METHODS

From these exchanges, both analysts and foremen gain understanding. As the foreman observes the cost aspects of difficult hand-forming operations, a definite relationship is built up between the fabrication problems and the problems of installation on the final assembly line. Frequently the foreman will point out that the critical requirement is the exterior contour and there's no point in "burning hours" on the interior flange to hold the plus or minus ten.

Out of their own departments, foremen can run creditable time studies. Frequently, they're greatly surprised at the results. When the parts per hour rate is computed, the familiar "Well, I'll be ....." or "I wouldn't have believed it," is often heard.

Though the period of two weeks is all too short for a program of this nature, it nevertheless is felt that it has proved of mutual benefit to production foremen and cost analysts. To a considerable extent, it has "cleared the air" of any misconceptions of time study and has created an atmosphere which fosters the unity and harmony essential to the solution of mutual manufacturing problems by the foremen and cost analysts.

The program also has had a broadening influence on both cost analysts and production foremen. When they are convinced that they are constantly in a position to effect improvements in the current state of the business and, then, with combined and cooperative effort they set out to achieve that improvement, the pattern of the future for "the whole team" is wholesomely established.

Tips

FOR TOP SHOP MEN

455 Responsibility gravitates to the man who can accept it. The measure of a man's ability to accept responsibility is, paradoxically, his ability to delegate much of what he accepts, to men he feels responsible for.

456 Hammer at habit—your own as well as others. The most inventive men are, paradoxically, the greatest creatures of habit in everything that doesn't apply to their specialty. Thus, you're likely to forget systems if you are very conscious of process, and vice versa. Or if you stress modern equipment, you may tend to overlook antiquated paperwork. The disadvantage of the genius is that he's lopsided.

457 Many men have said, in various ways, that the way to do a job is to get started. It's just as important to *get the job done*—and seemingly harder for some men. They use every excuse to postpone finishing up.

458 The man who is a success has one major peculiarity: he is right more than half the time. Statistics indicate that the average executive is right only 3% more of the time than if he'd flip a coin—*but that's a vital 3%.*

"What's the idea of taking it so easy, Jacobson? Remember I'm the foreman around here—not you!"

ROUND TABLE

Jungle Law

"I was talking to Anderson on the phone last night, Ed, and he threw out a pretty broad hint that he might have a job opening up over there in the near future."

"What's this? Skulduggery with our worst competitor? Of course you told him you were well occupied here and weren't in the market for a change?"

"Not at all, Ed. I do have a few ambitions of my own, you know."

"Well, I am surprised! I supposed everyone's open to a better deal, but I'd have thought you were happy with your present department and your chances of getting a promotion around here after a while, Al."

"Well, this is a good outfit, but I'm not so sure about the chances of a really good promotion any time in the next few years. I figured I could give a month's notice or so and change over to Anderson almost any time. Of course, it isn't a firm offer yet, and it may never come off, at that."

"Is your department in good enough shape to leave like that, Al?"

"Sure it is. It's in better shape than when I took over."

"Who would you suggest for your replacement?"

"What concern of mine is that? I just work here; I don't pick the foremen."

"But it is your concern to have a good lieutenant lined up for emergencies—in case you're out sick, or in case you leave suddenly."

"I don't know, Ed. If I started that now, it might give Reynolds the idea I'm on the lookout for another job, and he might not wait until I'm ready to leave if my aide was a good man."

"Oh, I think you can trust the management around here. But can you trust yourself to leave with a clear conscience if you don't make some effort to see that you are replaced?"

"Frankly, Ed, I'm a lot less worried about my conscience than I am about whether or not I make something of myself. It's the company's worry if they don't give me a good enough job to keep me; and it's their trouble if they can't replace me."

"Seems to me you owe the outfit something after all these years, Al."

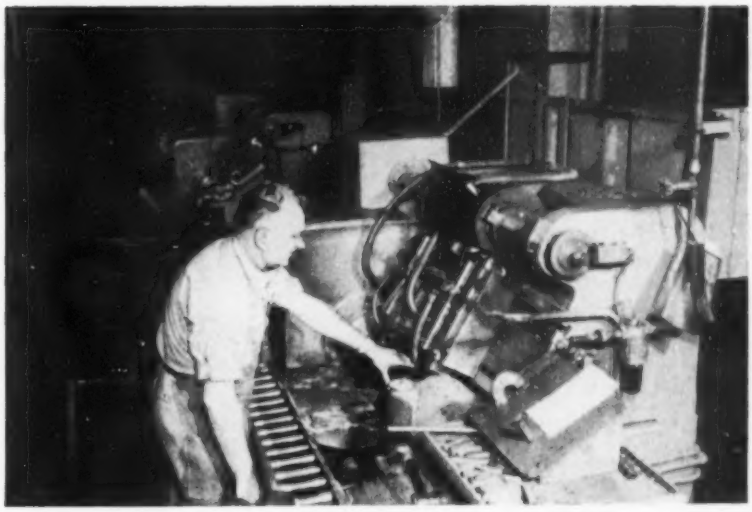
"What for? I've worked hard for Reynolds; I've done a better job in the machine shop than anyone else to date. What more can they ask?"

CAN *a company ask loyalty of its foremen to the point that they make arrangements for their successors? Is Al's attitude toward Reynolds too cynical? Or is Ed asking too much? Your opinions on this subject may help straighten out others in similar situations. Discussions of earlier topics appear on later pages.*

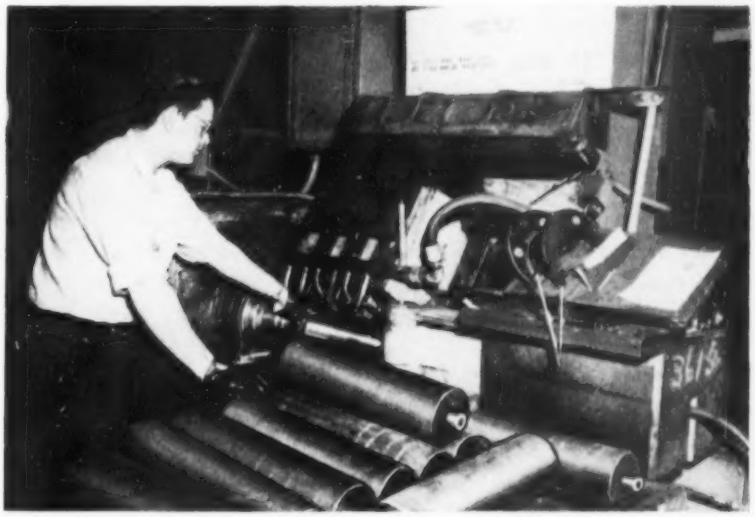
Conveyorized lines speed delivery of 105-mm shell

A million shells in 16 months proves full conveyorization is major factor in achieving maximum production

By GEORGE E AVERY, Plant Mgr
SHELL ORDNANCE DIV, THOR CORP



CAM-ACTUATED SLIDES on 50-hp Stamets shell lathes have brazed-carbide tools for cutoff and base facing operations on rough forgings. Forging length is held to 15.341-15.372 in., base thickness to 0.690-0.700 in. Automatic cycle of lathe provides time for operator to gage shell while another is being machined



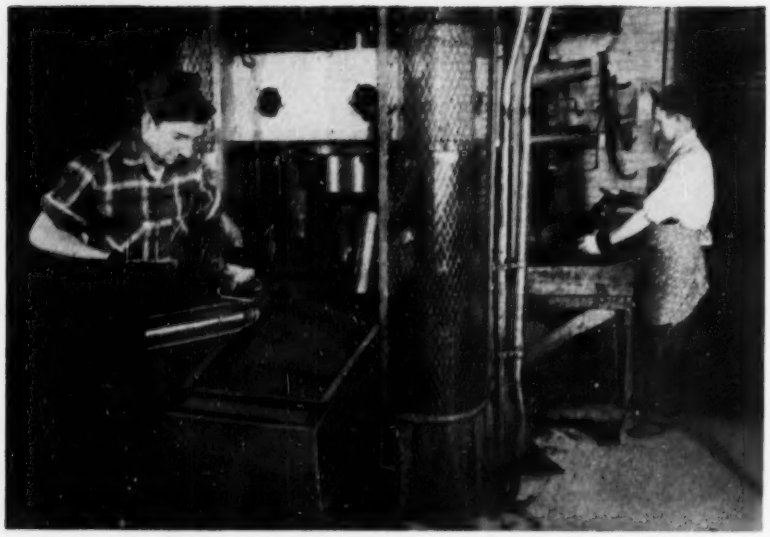
THREE CAM-SLIDE-ACTUATED carbide tools using square or triangular bits (see table), rough form turn bodies in 75-hp No. 2 Stamets automatic shell lathe. Cutting speed is 375 to 400 fpm when turning body to 4.125-4.225-in. average OD. Biggest problem at this machine is eccentric forgings

Production of 105-mm HE shell by Thor Corporation at Bloomington, Ill., is an unusual example of what can be done by clear thinking and determination. The original contract was signed on April 5, 1951, and full production began on October 17 of the same year. On Feb 10, 1953, the company delivered its one millionth shell.

In the six months from April to October, the company converted a deactivated, dirt-floored, broken-down foundry into a modern shell plant fully equipped with special machines and equipment.

Whenever possible, conveyors are used to minimize handling costs and to insure proper separation of steel heat lots of forgings. These are stacked according to lot numbers in a receiving area at one end.

Bores of forgings are shotblasted in a Pangborn unit, then loaded on an overhead chain conveyor that carries them to centering, cutoff and face-base, rough turn, and cold-nosing operations. Single-spindle vertical LeMaire centering machines with automatic cycle controls, but with hand-fed spindles, drill center holes in base-end bosses. *(NEXT PAGE, PLEASE)*



CARBIDE DIE in 350-ton Watson-Stillman hydraulic press cold forms nose end of forging to 25.530-in. radius, holding max OD at front bourrelet to 4.220-4.245 in. Spring collet in locating fixture centers shell with die in ram. Three men lubricate, position and remove shell bodies at this press. However, a power conveyor is now being installed to remove shell bodies automatically

No. 2 Stamets special shell lathes, each equipped with a 50- or 75-hp motor and V-belt drive, are employed for cutoff and face base, and rough turning operations, also later along the line for finishing turning. Rough-turned shell are cold-nosed in 350-ton Watson-Stillman hydraulic presses, using spring-collet holders and carbide dies.

Gravity roller conveyors move nosed shell from the presses directly to the heat-treat dept where they are hardened and drawn.

Hot forgings from the draw furnace are carried by overhead chain conveyor outside the plant for slow cooling to 700 F, then carried through a water-spray station for quick cooling to 100-125 F, leaving enough heat so the shell will dry before they reach the adjacent Pangborn shotblaster where cavities are again cleaned. Shells are then checked for hardness, and the

CARBIDE TOOL GUIDE FOR ROUGH MACHINING 105-MM SHELL FORGINGS

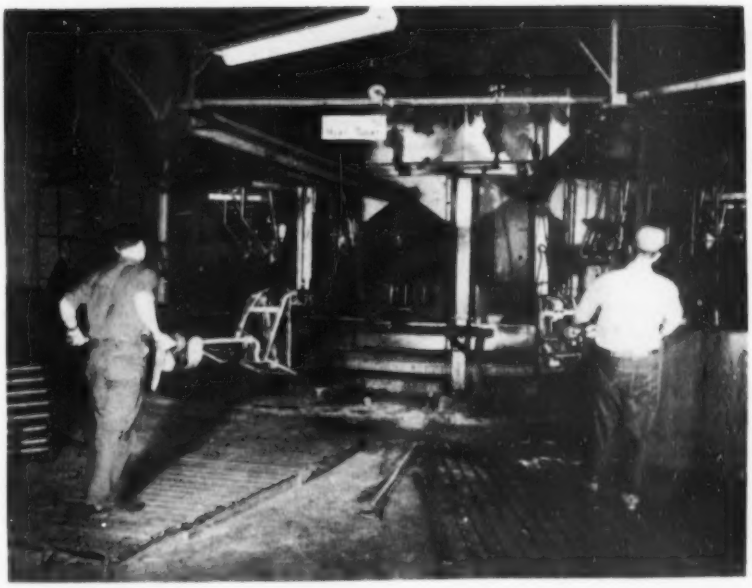
Tool Data	Condition of Forging: Normal	Soft	Eccentric	Hard
CUTOFF AND FACE BASE — No. 2 Stamets Lathes—Two Brazed-Type Carbide Tools				
Spindle Speed	150 rpm	150 rpm	150 rpm	150 rpm
CUTOFF TOOL				
Tip grade	Kennametal K2S	Kennametal K2S	Kennametal K2S	Kennametal K2S
Chip breaker	0.020 in. deep 0.065 in. wide	0.020 in. deep 0.065 in. wide	0.020 in. deep 0.065 in. wide	0.020 in. deep 0.065 in. wide
Feed per rev.	0.009 in.	0.009 in.	0.009 in.	0.009 in.
Depth of cut	5/8 in.+	5/8 in.+	3/4 in.+	5/8 in.+
Pcs per grind	75	75	50	50
FACE BASE TOOL				
Tip grade	Kennametal K2S	Kennametal K2S	Kennametal K2S	Kennametal K2S
Chip breaker	0.020 in. deep 0.125 in. wide	0.020 in. deep 0.125 in. wide	0.020 in. deep 0.125 in. wide	0.020 in. deep 0.125 in. wide
Feed per rev.	0.018 in.	0.018 in.	0.018 in.	0.018 in.
Depth of cut	1 in.+	1 in.+	1 1/4 in.+	1 in.+
Pcs per grind	125	125	100	75
ROUGH TURN — No. 2 Stamets Lathes — Three Clamp-Type Carbide Tools				
Spindle speed	350 rpm	350 rpm	350 rpm	350 rpm
Food per rev.	0.040 in.	0.040 in.	0.040 in.	0.040 in.
Depth of cut	1/4 in.+	1/4 in.+	5/8 in.+	1/4 in.+
Bit grade	Kennametal K4H	Kennametal K2S	Kennametal K2S	Kennametal K2S
Bit size	3/4 in. square 1 1/2 in. long	3/4 in. square 1 1/2 in. long	Triangular 5/8 in. inscribed circle	3/4 in. square 1 1/2 in. long
Rake angle	7° Negative	7° Negative	7° Negative	7° Negative
Chip breaker	None	0.020 in. deep 0.125 in. wide	None	None
Pcs per index	40	30	20	25

hardest and softest shell from each heat lot are set aside for laboratory testing.

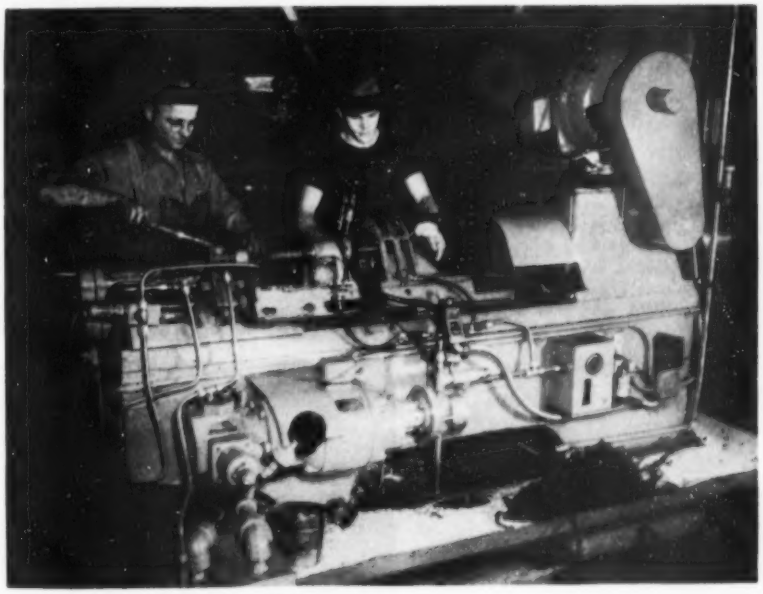
Originally, draw cycle and temperature were varied for each lot to insure even machinability. But tests proved that the machinability of the hardened, quenched and drawn shell given a standard treatment did not vary enough to justify the extra cost.

An overhead conveyor with special carriers moves hardened shell to nose-boring and finish-turning stations, and finally delivers them to the 12 × 12-in. Peerless power hacksaws where center bosses are removed from the base ends. Specially tooled Reid lathes bore, face, and chamfer the open end of the shell. Reid lathes of the same size also are used later along the line for base facing, band groove turning, and rotating band turning. Collapsible taps are used in Landis threading machines for nose threading.

Tapped shell bodies are cleaned in an International spray-type washing machine, and inspected, before copper rotating bands are applied in West tire setters. Then bands are tested and turned, baseplates are applied with Taylor-Winfield rotary seam welders, and shell are given final shop and government inspections. Finally the shell are Bonderized and spray painted according to Ordnance Dept specifications, then shipped to a loading center.



SHELLS ARE HEATED to 1600 F in 55-min cycle in Jet Combustion 20-ft rotary-hearth furnace for hardening. Special rotary oil quench machine is at right. Shell are loaded and unloaded with air-powered grabs suspended from tramrail and guided by operators. Similar unit with 24-ft rotary hearth draws hardened shell at 1130 F



REID 9-IN. LATHES with special hydraulically actuated slides bore, face, and chamfer nose end of heat-treated shell. 100% gaging is necessary, and operator does this during machine cycle and returns machined shell to conveyor. Setup man is shown checking cycle after resetting boring bar

MOSTLY CARBIDE TOOLS

Except for centering, staking, notch milling, band turning, and nose-tapping operations — where HSS, Stellite and Tantung tools are employed, all machining is done with carbide tools.

Because there are considerable variations in forgings, tools for cutoff, base facing, and rough turning must be changed to suit (see table). These tool changes are made by tool setup men as soon as machining difficulties are encountered when a new lot of forgings is started. Brazed carbide-tipped tools are used for cutoff and base facing in No. 2 Stamets lathes. Clamp-type holders with solid carbide square, triangular, and round bits are used for roughing and finish turning on the same machines.

Each operator performs his own inspection, a sign above each machine specifying the frequency of these checks. A board at each machine holds the necessary gages. This minimizes the number of inspection stations and has helped cut rejects to a minimum.

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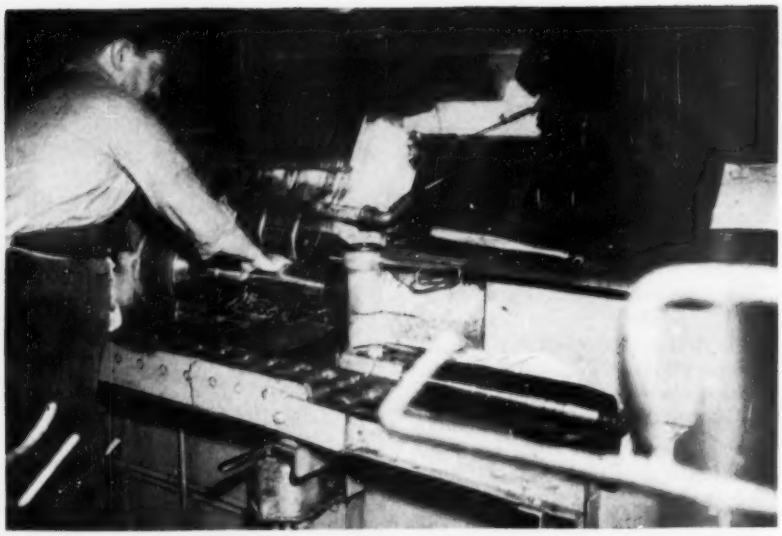
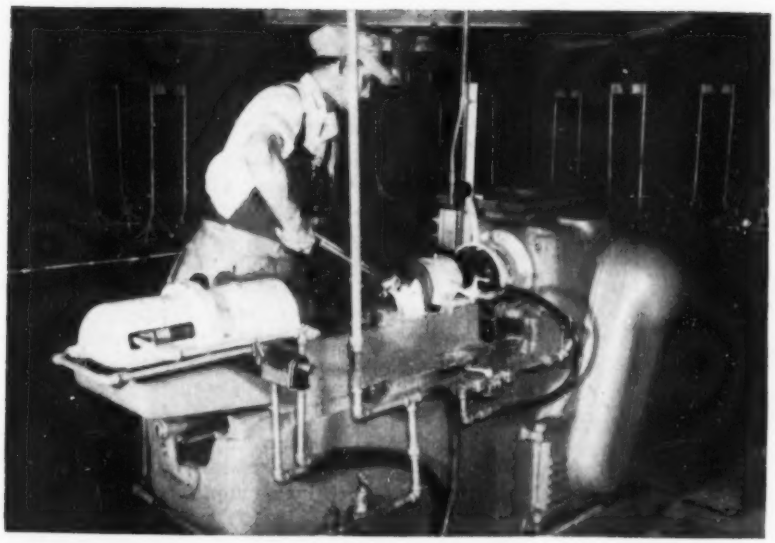


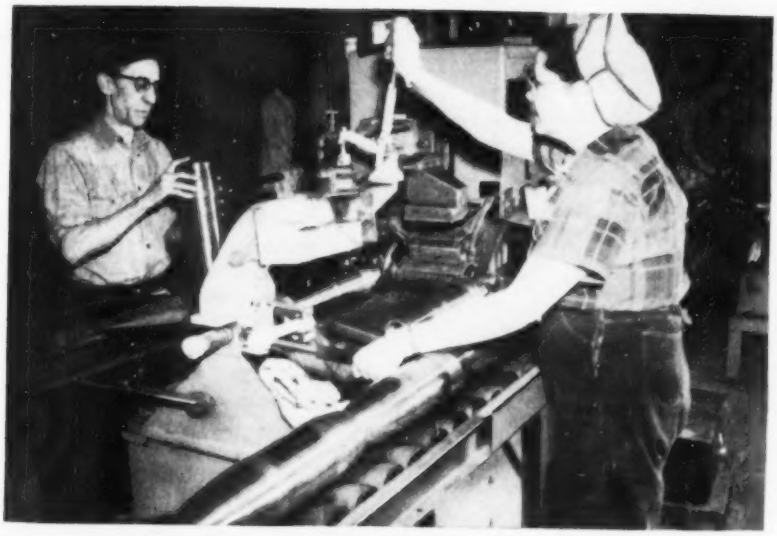
THREE ½-IN.-DIA carbide bits in cam-controlled slides contour turn hardened shell in this No. 2 Stamets automatic finish-turning lathe. Shell is turned at 610 fpm with 0.020-ipr feed and finish is so fine that bourrelet grinding has been eliminated

BAND GROOVE is turned in body of shell with carbide form tool on hydraulically actuated rear slide. Gaging is 100%, with checking being done while next shell is being machined in automatic lathe cycle. The groove is approx 0.040 in. deep and is 3.030-3.035 in. from base

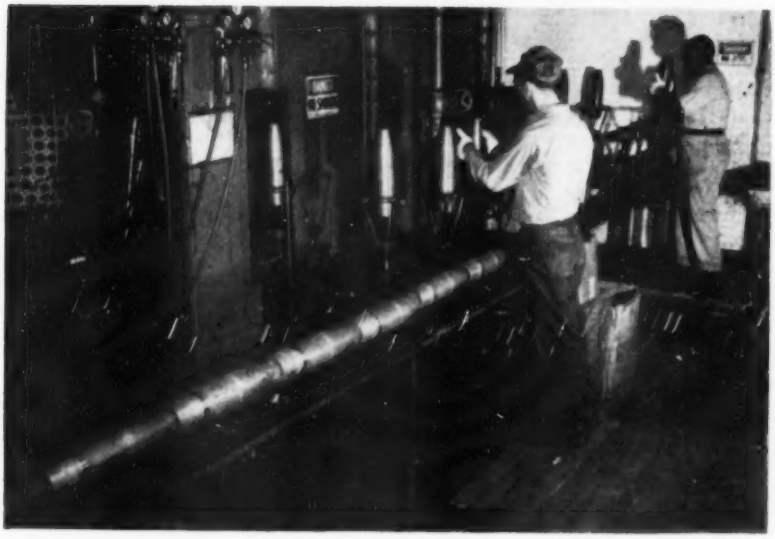
FIVE 3/16-IN.-DIA end mills in special head on Kent-Owens miller cut staking notches in nose end of shell. Operator transfers milled shell to Schmidt knurling machine at right for scoring ribs in band groove



LANDIS THREADER with air-powered steadyrest and collapsible tap cuts 2-in.-12 NS 1 thread for fuse. Shell are delivered on gravity roller conveyor, taken away on overhead chain conveyor for delivery to automatic washing machine

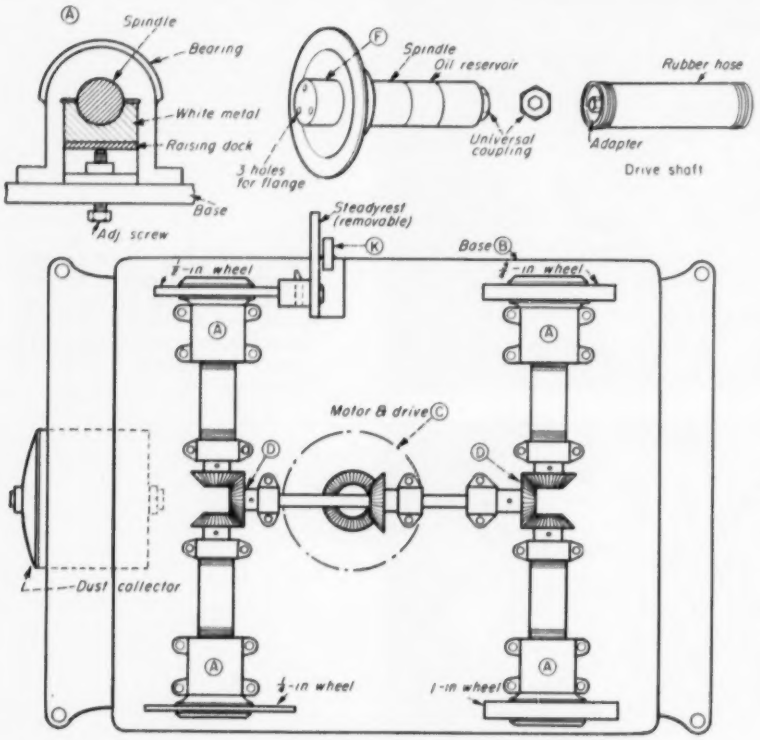


SHEET STEEL BASEPLATES are welded to base ends with double-wheel Taylor-Winfield seam welders served by gravity roller conveyors. Plates are tested with chisel at frequent intervals to insure high quality of welds



CONVEYORIZED BINKS automatic paint unit finishes inside and outside surfaces of shell to Army specifications, then delivers them to government inspector and to shipping bench

Practical Ideas



How to Improve Pedestal Grinders

In our shop we noticed several weak points involving the small abrasive wheels used to modify lathe tool shapes and rakes, and for sharpening:

(1) Though each workman was supposed to mount the wheel he wished to use, and to dismount it after use, once a wheel was on a spindle it was apt to be left there. (2) The wheel at the user's right hand, on a double ended grinder was favored. (3) Since the lathe tools most often requiring sharpening move from right to left, the right hand corner of the abrasive wheel got the most use. (4) The bulk of the motor prevented the fullest access to the side nearest it. (5) The shadows cast by the motor often interfered with proper visibility. (6) Because they were easiest to get at, the wheel edges on the outside corners often wore out, while the rest of the wheel was fresh. (7) The soft wheels, so desirable for fine grinding of hard steel, quickly became bumpy due to insufficient stiffness of the shaft within the bearings inside the motor. (8) The accumulation of metal dust made it difficult to keep the area tidy. (9) Though a firm support was sometimes necessary, many jobs did not require one, and often the user dismantled the grinding rest for greater wieldability. (10) The fastening of adjustable rests, often embedded in grit, was time consuming and annoying.

In the interest of efficiency we devised the following changes:

We arranged 4 heads on a table and placed a vertically mounted motor under it (Item C) which drove through an arrangement of spiral bevels (D) to the height of the grinding heads. Thus there were always 4 wheels and 8 corners available. (Points 1, 4, 5, 6)

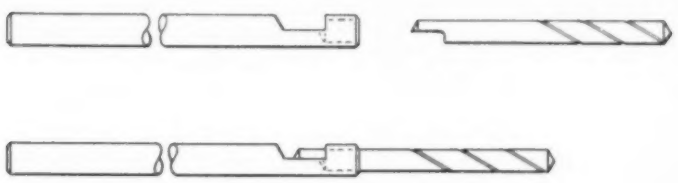
Also under the table, we placed a welder's fume extractor (suction 250 cfm) (E), and ran flexible tubes to the top of each dust hood. These hoods are the kind that may be rotated away from the side wheel surface not being used, or raised several inches and thrust back by a simple hand movement. (Points 8, 10)

The wheels are reversible in order that both sides may be used. We did this by replacing the nut generally used with 3 screws as shown (F). We used single-ended wheel-mountings, and drove each spindle through a small flexible mounting and a light tubular driveshaft, (G). The hexagon socket of an Allen screw makes an excellent driver for each spindle to mate with a slightly spherical hexagon screwhead brazed into the tubular driveshafts. This type of mounting eliminates belt vibration from the grinding spindles. (Points 2, 3, 7)

To add stability, we designed the bearings close together and, instead of fitting the belt pulley over the shaft, between its bearings, we incorporated the pulley into the shaft as one piece, (H). We used plain bearings that could easily be adjusted. They took up less space than ballraces and were free from grit catchers (Point 7)

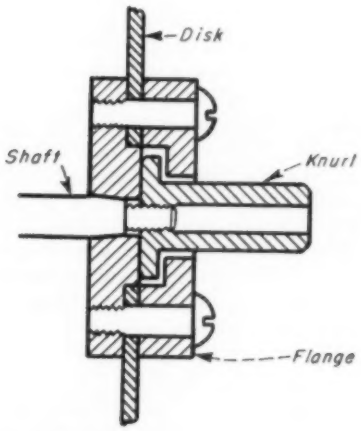
Only one rest adjustment was left above the table. (J) This was for vertical height. The base is triangular with a 3-point contact on the heavy steel plate table. Attached to the base is welded a C clamp, (K), with a fairly wide throat. It is easily manipulated by means of a clamp-screw placed under the table. (Point 10)

We are convinced that the cost of installation and increased use of power are more than offset by the time saved in having this handy and compact arrangement. *N Palmer, Paddington, N S W, Australia*



Extension Drill Adapter

Instead of sweating or brazing a drill into an extension, as is customary, make a bayonet socket in the extension as shown. A hole is drilled into the end of the extension for a slip-fit with the drill. Then a slot is milled halfway through the extension just at the bottom of the hole. The drill shank is ground halfway through at the end and is inserted into the extension. Thus, the drill is easily inserted or removed with only a light tap on either end; even without removing the extension from the drillchuck. *F Baker, Ilion, NY*



Knurled Disk Removing-Tool

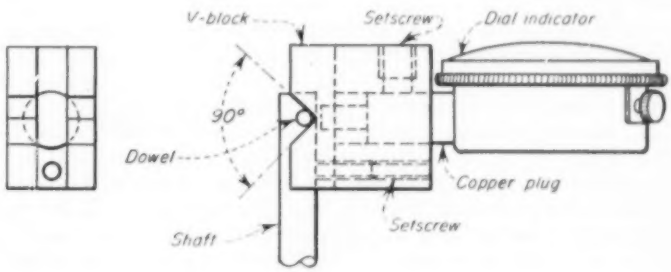
We had a great deal of trouble removing the disks, used in testing small motors, from the end of a tapered and threaded shaft. They often locked and in pulling them there was danger of bending either the disk or the shaft or both.

The problem has been nicely solved by replacing the ordinary nut used to hold the disk on the shaft, with a knurled, threaded, and flanged knob. A chamfered flange fits over this and is screwed to the disk. The knob exerts pressure on the flange when unscrewed and this easily loosens the disc. By using an air cylinder and piston on the shaft, this device can be used for production testing. *Chris Sorenson, Racine, Wis*

Gage Checks Pinhole For Center Alignment

To determine whether pinholes were properly centered in shafts when the tolerance on the pinhole size was too large for conventional methods, we built the gage shown. It consists of a dial indicator mounted on a V-block so that the contact point emerges exactly at the center of the bottom of the 90° "V." A channel slightly larger than the shaft dia is cut through the block at 90° to the "V."

A dowel pin is placed in the pinhole to be checked and the gage is slipped over one side of the shaft, pressing the pin against the opposite wall of the hole, and the indicator is read. Then the gage is slipped over the opposite side of the shaft, to press the pin against the other wall, and another reading is taken. One half of the difference between the two centers is the amount that the hole is off center. *C Sorenson, Racine, Wis*

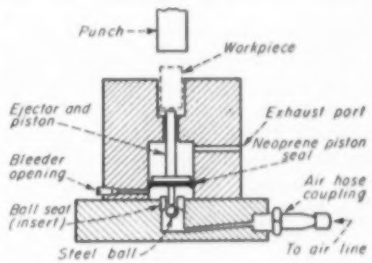


Gravity Check Valve Controls Ejector

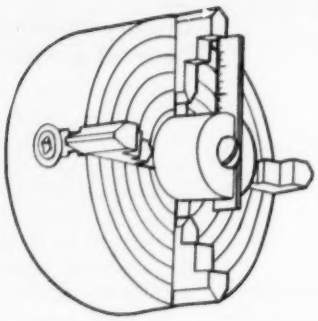
A simple check valve provides the control for an air operated ejector for parts which are loaded into deep cavities on some types of small press operations.

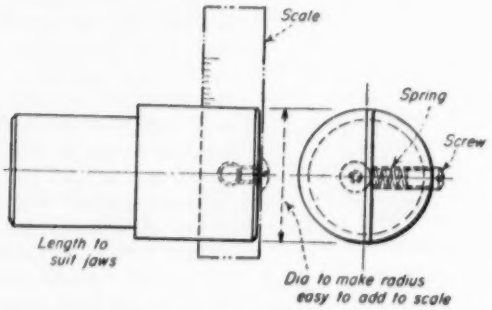
As shown, the part is in its loaded position, with the ejector plunger supported by a steel ball which is held up by air pressure.

As the press closes, the part drops a short distance before it bottoms for the press work, and the lower end of the ejector pin thus forces the ball off the seat. Air pressure on both sides of the ball instantly becomes equal and the ball drops to the bottom of its chamber. As the press opens, the air pressure on the piston ejects the part, but at the top of the ejector stroke the exhaust port is uncovered and the sudden rush of air lifts the ball back on its seat ready for reloading. The bleeder port allows air to escape as the piston is displaced by reloading.



A ¾-in. dia piston is satisfactory for most small parts. A disk of ⅛-in. thick neoprene can be lathe turned for a piston seal. The exhaust port should be a ⅛-in. dia hole or a slot. 3/16-in. dia steel ball working in a 5/16-in. dia pocket gives good results. *Don R King, Milwaukee, Wis*





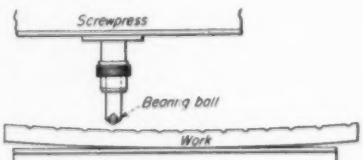
Quick Centering Gage for Independent Chuck Jaws

When a universal chuck is unavailable, and a great deal of round chucking work of different diameters must be done in an independent chuck, time can be saved by bringing the four jaws close to the centered position by use of this centering gage.

The gage consists of a steel body having two diameters. The small diameter is turned to make a slide fit with the center hole of the chuck. The larger diameter is made to some convenient radius, one that can readily be added to the reading of the scale above the body. A slot is made in the end adjacent to the center line. A hole is tapped at 90° to the slot. Into this slot a flat-ended compression spring is inserted together with a headless setscrew. This is used to hold the steel scale while the desired reading is set. The dimension of the jaw is obtained by adding the radius of the body diameter to the reading of the scale.

A round-head screw is placed in the end of the gage body to prevent the scale from moving while the other jaws are being set.

This method of adjusting the jaws is more accurate than relying on the concentric circles on the face of the chuck. It is of greater advantage when the jaws are hardened and cannot be bored to the exact size of the job. *Leonard Maunu, Milwaukee, Wis*



Ball-Bearing Holder Straightens Warped Plates

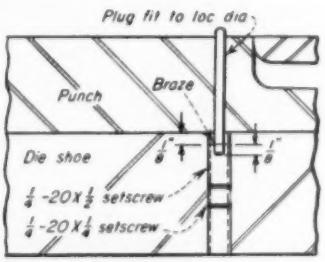
Flat pieces of toolsteel which have warped after hardening may be straightened with the aid of a screwpress having a ball-bearing insert in a holder. A series of shallow impressions is made on the hollow side of the workpiece; however, care should be taken to keep impressions away from openings and fragile sections of the workpiece. When a sufficient number of impressions have been made for flatness to be restored, the impressions may be ground off with a surface grinder.

A similar procedure is followed to straighten round work by supporting the piece in "V" blocks while the impressions are made.

Although a hammer can be used, a screwpress has the advantage of attaining greater accuracy with less fatigue. *R J Mottl, Riverside, Illinois*

Hot Wire Welds Plastic Rod or Tube

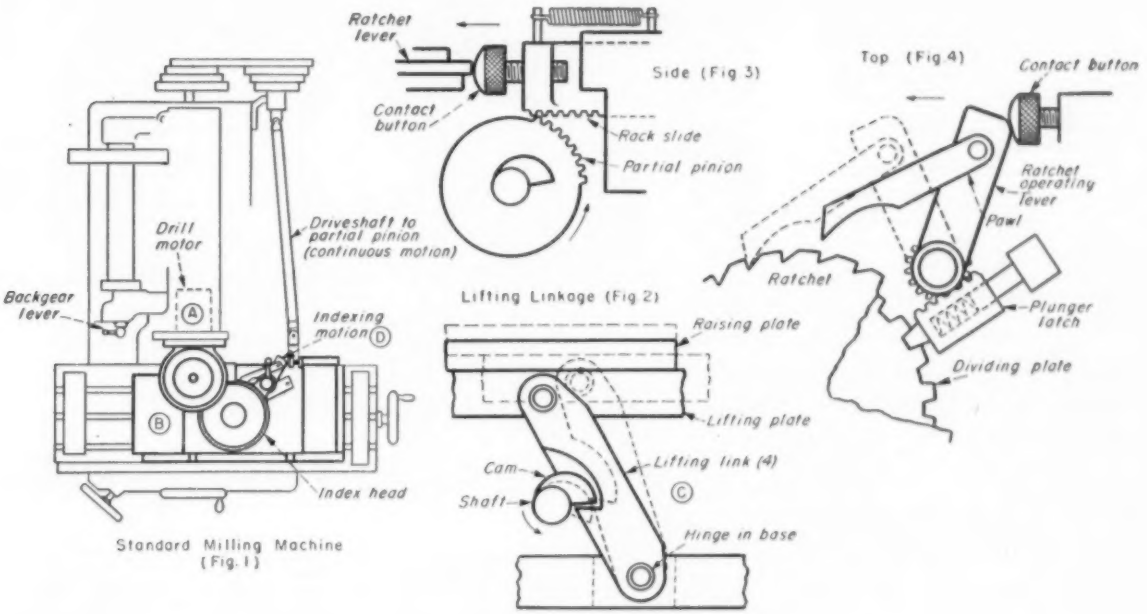
An electrically heated wire does an excellent job of joining the ends of thermoplastic rods and tubes. The ends to be joined are squared and butted together, then the wire is run right through the joint. As the wire passes through, the edges melt and then fuse together behind the wire to form a strong joint having very little flash. Ceramic handles can be placed on the wire to simplify holding it without danger. Rods or tubes can be placed in a notched V-block to maintain alignment. This method will also work very well for repairing cracked sheets of plastic. *G D Carlsen, Manhattan Beach, Calif*



Small Locating Studs Held in Setscrew

When a locating stud in a compound die is ⅛-in. dia or smaller, we braze it into a setscrew and make it a plug fit through the punch as shown. The locator can be removed through the die shoe when the die is sharpened and then replaced and set to the proper height to engage the stock.

This is standard practice in our design room. It simplifies placing the stud and minimizes breakage or bending. *R A Iorns, Dayton, Ohio*



Automatic Indexing and Drilling Fixture

Here is a specially designed drilling fixture that automatically raises and lowers a dividing head to a drilling unit placed in a fixed position above the jig.

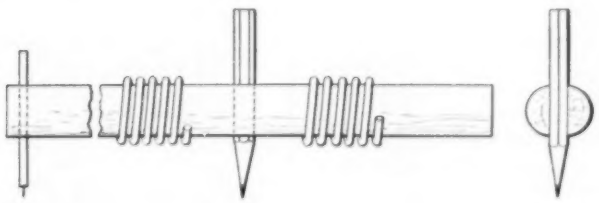
To drill a component, the power is transmitted from the gear unit of a milling machine to a platform-like fixture upon which the dividing head rests. A linkage in the fixture under the platform lifts the dividing head and component to the drill. The head continues to rise until the desired operation is completed. Then, because of the construction of the camshaft, which has raised the platform, it falls back of its own weight.

The next hole to be drilled is then indexed by a partial gear operating a lever which is pinned to the index head operating lever unit and the process repeats.

This fixture may easily be installed on any standard milling machine with the required drive.

The accompanying illustration omits many details and measurements since these depend on individual conditions, but the four main points for any designer to consider in constructing the fixture are:

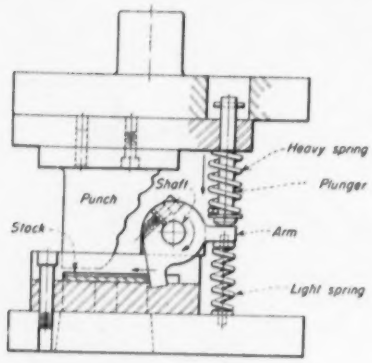
Drill motor (A) which continually drives only drill. Driveshaft which continually drives camshaft and partial pinion through universal linkage (B). Lifting plate raised by action of cam on two of four links (C). Indexing motion (D) from partial pinion to rack to ratchet through contact button, with spring return on rack. *Allan Clarke, Lancashire, England*



Beam-Compass From Broomstick

Using a ¾-in. dia broom handle cut to a 4-ft length, drill a hole press fit for a ¼-in. dia drillrod. Harden a piece of drillrod and grind a point, centered, at one end. Insert this rod into the hole as a pivot for the compass. Bandsaw the stick from the opposite end to form a slot slightly narrower than the thickness of a pencil and about two-thirds of the stick's length.

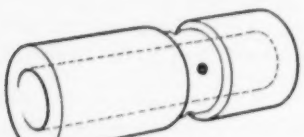
To hold the pencil firmly, fit two springs snugly over the broomstick and press the pencil between them. Adjustment of the pencil point is done by separating the springs, sliding the pencil to the proper position and bringing the springs together to tighten the grip. In spite of a seemingly loose design, this device is, firm and steady; makes an excellent emergency beam-compass. *Robert Mery, Staten Island, NY*



Pivoted Guide Speeds Accurate Press Operation

To pierce and cutoff a long, narrow piece of stock with extreme accuracy, we used this device. It enabled us to both feed the stock at a rapid rate and produce parts to the required dimensions. Accuracy is assured by the positive location of the stock against the fixed side of the guide to insure quick feeding of coil stock.

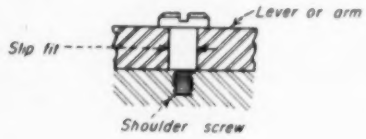
As the press descends, the plunger strikes the pivoted arm, which pushes the work against the fixed guide just before the punch hits. The lower spring keeps the movable arm away from the stock while it is fed through the die. A stronger upper spring on the plunger overcomes the lower spring as the punch descends. *Charles E Hayward, Alma, Mich*

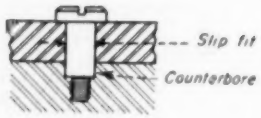


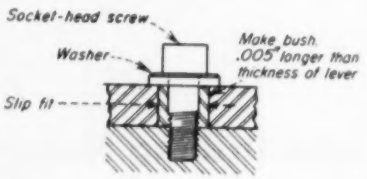
Grooved Bushing Improves Flywheel Installation

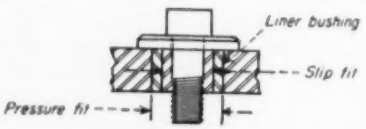
It is a frequent problem to drill an oil hole in a rebushed flywheel, and in most cases more time is consumed by making the oil hole than by the actual machining and assembly of the bushing.

This extra, time-consuming work can be eliminated by cutting a 0.030-in.-deep groove to match the location of the existing grease hole in the flywheel. Then a series of radial holes is drilled in the groove. These holes make it unnecessary to align the existing grease hole with the new hole in the new bushing. If the bushing turns in the flywheel, the bearing will still receive lubrication, which is an added advantage. *Gerald Leonardy, Detroit, Mich*









Improved Shoulder Screw

In the design of jigs, fixtures, and various parts of automatic devices, it is frequently necessary to use a shoulder screw. For many reasons, the conventional style of this fastener is not always practical, especially if the screws are made in the shop. In addition to being weak, troublesome to make, and difficult to properly heat-treat, it is necessary to counterbore the main part of the fixture, to add strength against side pressure.

We use a standard socket-head screw, a standard jig bushing, and a hardened washer. (These washers are purchased hardened and ground.) If the arm or lever is not to be hardened and a hole in these parts requires a hard wear-surface, we press a liner bushing into the hole. This method is faster and better. *George F Oliver, Warren, NY*

Winner No. 171

of

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February 2, 1953

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Gordon W Richards

Allentown, Penna

Simple Tool for Spheres

for the best PRACTICAL IDEA

An extra payment of $25 is made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

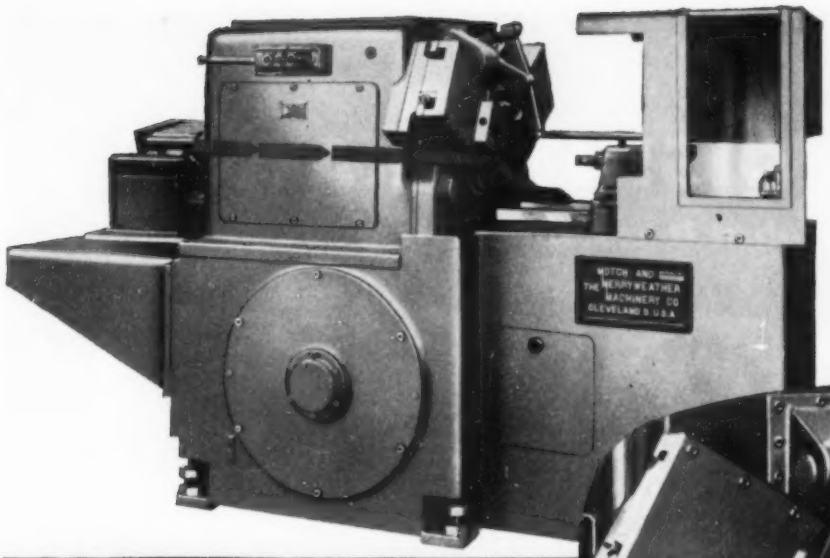
PAYMENT—$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of the issue. The winner will also be announced in these pages as soon thereafter as practicable.

JUDGES — A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

REQUIREMENTS — Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co., Inc., and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

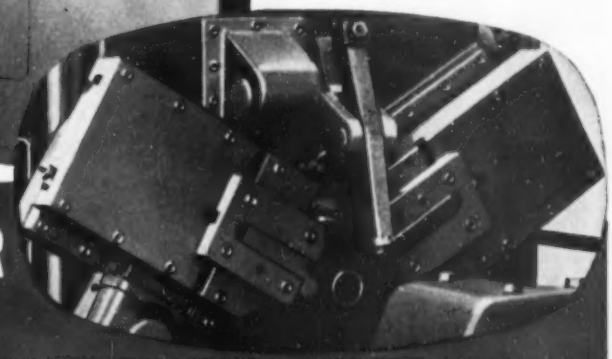
HOW TO ENTER—Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42d St., New York 36, N.Y.



MP/SF

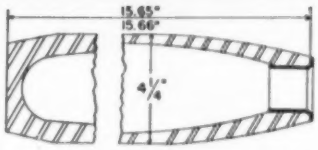
Most Production per Square Foot

Conveyor carries shells to hopper. Shells are fed automatically through hollow spindle, machined and ejected onto conveyor.

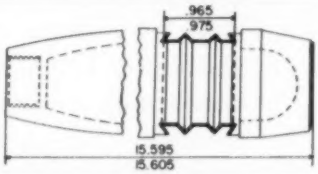


MOTCH & MERRYWEATHER *Automatics* make the most of AUTOMATION

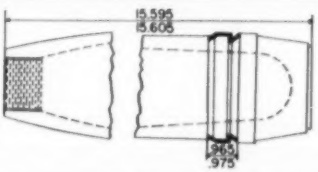
Material: shell steel SAE 1050.
Operation: bore, face, chamfer (nose end)
Estimated Production: 220 pcs/hr. @ 100%.



Material: shell steel SAE 1050.
Operation: face base, turn band groove and band relief.
Estimated Production: 120 pcs/hr. @ 100%.



Material: shell rotating band.
Operation: turn band.
Estimated Production: 220 pcs/hr. @ 100%.



This single-spindle, form-turning automatic, developed for civilian production, has been assigned to much heavy duty munition work. Loading, positioning and unloading are completely automatic. All functions are actuated by hardened cams. With operator fatigue eliminated, one man can service several machines.

Manufactured by — THE MOTCH & MERRYWEATHER MACHINERY CO. —
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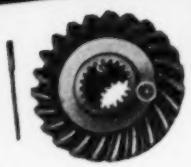
Builders of Circular Sawing Equipment, Production Milling, Turning and Special Machines

PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT

METAL DISINTEGRATION

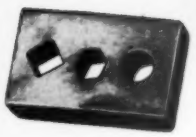
and what it can do for you . . .

Remove Broken Taps fast without distortion

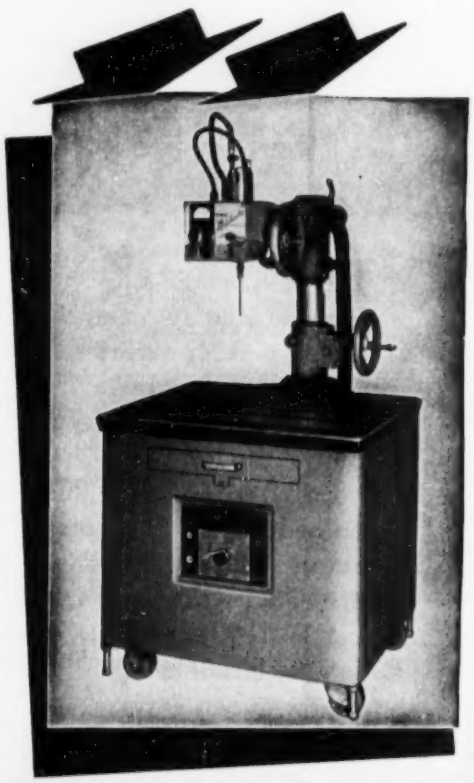


Cut oil holes in hardened gears without annealing

Cut dovetails in hardened dies



Cut any shape hole in cemented carbides



Literally hundreds of thousands of dollars are saved annually by corporations that are using Metalmasters in just tool and die repair alone.

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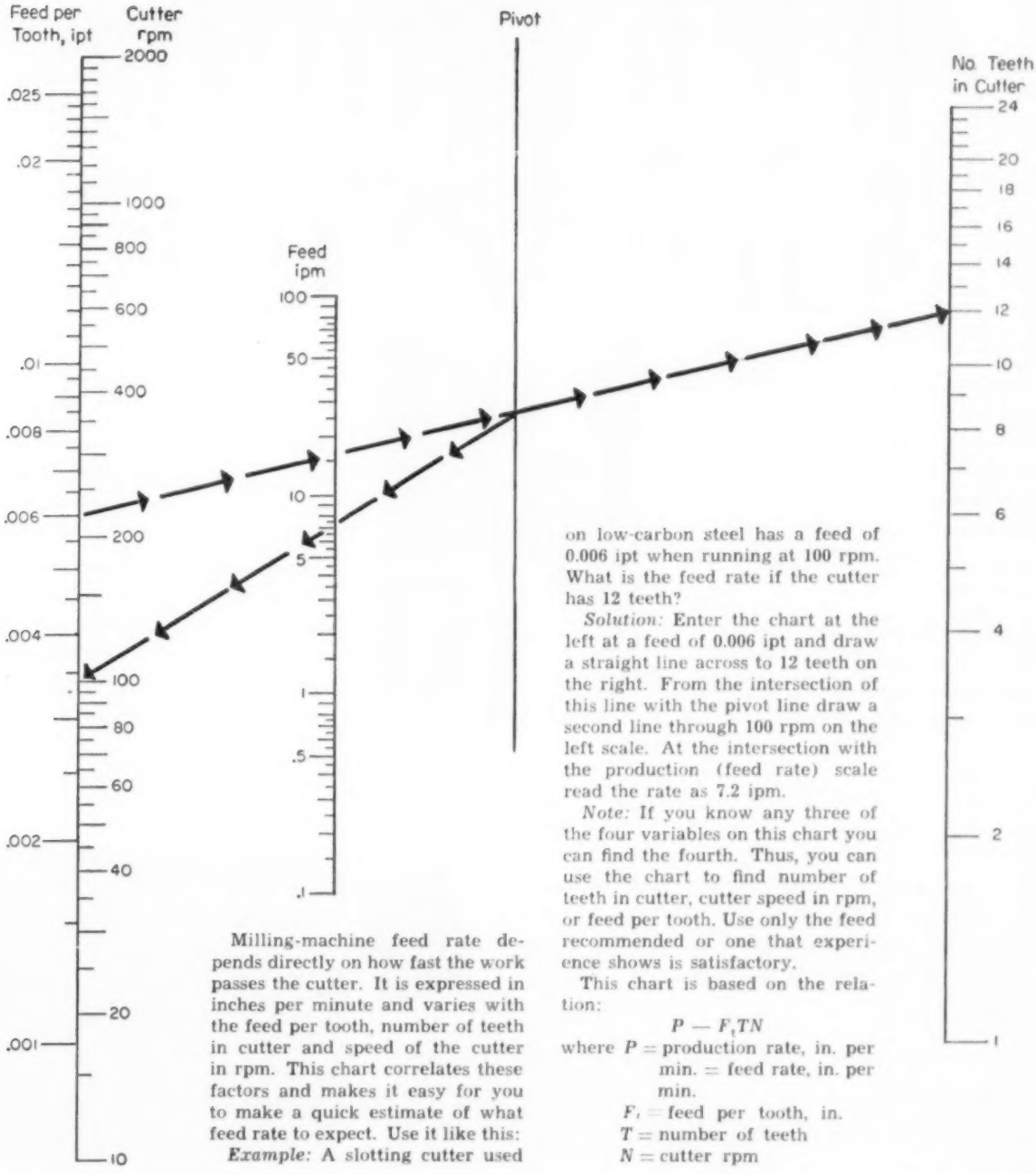
Milling-Machine Feed Rate

BY TYLER HICKS



Milling-machine feed rate depends directly on how fast the work passes the cutter. It is expressed in inches per minute and varies with the feed per tooth, number of teeth in cutter and speed of the cutter in rpm. This chart correlates these factors and makes it easy for you to make a quick estimate of what feed rate to expect. Use it like this:

Example: A slotting cutter used on low-carbon steel has a feed of 0.006 ipt when running at 100 rpm. What is the feed rate if the cutter has 12 teeth?

Solution: Enter the chart at the left at a feed of 0.006 ipt and draw a straight line across to 12 teeth on the right. From the intersection of this line with the pivot line draw a second line through 100 rpm on the left scale. At the intersection with the production (feed rate) scale read the rate as 7.2 ipm.

Note: If you know any three of the four variables on this chart you can find the fourth. Thus, you can use the chart to find number of teeth in cutter, cutter speed in rpm, or feed per tooth. Use only the feed recommended or one that experience shows is satisfactory.

This chart is based on the relation:

$$P = F_t T N$$

where P = production rate, in. per min. = feed rate, in. per min.

F_t = feed per tooth, in.

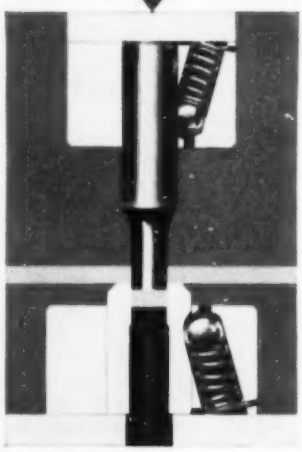
T = number of teeth

N = cutter rpm

Special Punches *with* Standardized R-B Features

Save time in die designing, construction and use by adopting as your tooling standard the most widely accepted piercing system in the industry. This standardized R-B concept of interchangeable punches and die buttons will efficiently answer your needs on both simple and complex applications.

The standardized R-B ball lock in special or standard retainers gives positive radial alignment to all R-B punches and mating dies without additional keying. This same spring loaded ball lock permits quick changing of punches yet holds them securely in place.



Special punch-points of any shape or size can be made to your specifications and these punches will have all the desirable features of standard R-B equipment. Also, R-B guarantees continuing benefits from standardization by manufacturing each punch and die button to print dimensions, thus insuring identical replicas when replacements are required.

TOOL STANDARDIZATION IS THE BASIS FOR EFFICIENT AND ECONOMICAL PRODUCTION. WITH R-B YOU GET THE ACCEPTED STANDARD OF THE SHEET METAL INDUSTRY—IN STANDARD DESIGN FEATURES THAT SAVE IN ENGINEERING, DIE CONSTRUCTION AND OPERATION.

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How to Machine the Rarer Metals...I

Increasing use of the rarer metals—among them tungsten, molybdenum, tantalum, titanium and zirconium—for modern scientific and industrial application, and the greater availability of these materials, has necessitated research on optimum machining conditions. The tooling recommendations given here are based on tests carried out by Protolite, Ltd, Central House, Upper Woburn Place, London, WC1.

TUNGSTEN

Chiefly used for components of small diameter, tungsten has a tendency to fracture unless light cuts are taken. Generous rake and clearance angles must, therefore, be used when machining parts made of this metal.

Tungsten in rod form should be centerless ground before machining. In this condition light cuts are more readily and effectively applied.

Tungsten produces a short type of chip, and its fibrous nature tends to cause cratering of the tool tip. There is also a tendency for tungsten to build up on the cutting edge, but it can readily be removed, as the particles of tungsten carbide in the hard metal are not pulled out.

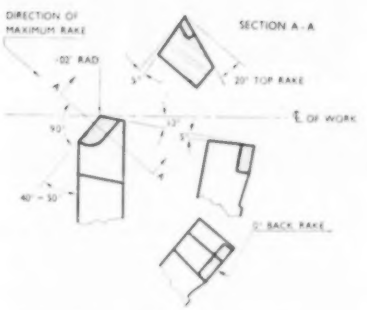
Prolite I C tungsten carbide† is specified for roughing and finishing, with work speed of 70 to 80 fpm and tool feed of 0.006 ipr. Minimum depth of cut is 0.04 in.; below this figure tool life is considerably reduced.

MOLYBDENUM

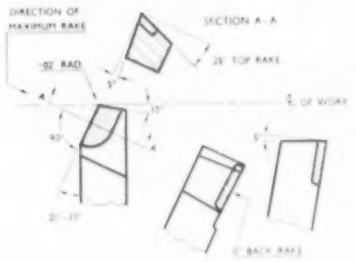
Conditions required for machining molybdenum successfuly are in some ways similar to those for tungsten. Molybdenum also has a tendency to fracture if high stresses are induced, and the material is inclined to drag or tear during machining. It is necessary to use a top rake of 25°.

Prolite I C † is recommended, with a workpiece speed for roughing of 130 fpm and for finishing from 310 to 320 fpm.

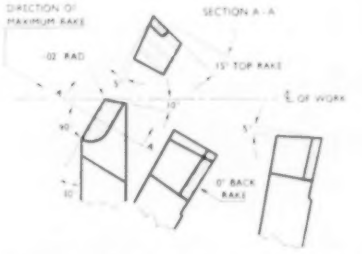
Feed for roughing is 0.01 ipr and for finishing 0.006 ipr.



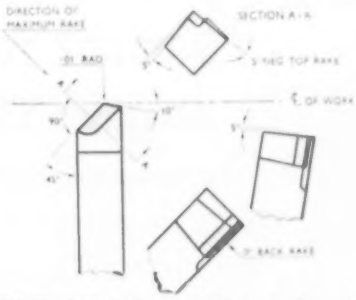
TOOL-POINT ANGLES for turning **tungsten. Materials should be centerless ground before machining**



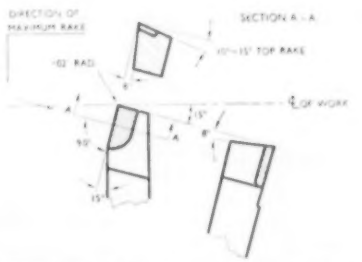
TOP RAKE OF 25° is needed to turn molybdenum satisfactorily. The metal is inclined to drag and tear



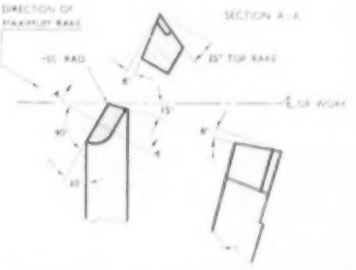
CUTTING EDGE OF TOOL should be honed with a fine diamond lap when machining tantalum



OUTER SKIN of unmachined titanium is deeper than on most other metals. Negative top rake of 5° is required



ROUGH TURNING of zirconium requires 10-15° top rake. Worn or dull tools must not be used



WHEN FINISHING zirconium, light skimming cuts should not be taken, because of danger of spontaneous combustion

Depth of cut is not critical and can vary between 0.03 and 0.06 in. Hone the cutting edge lightly with a fine hand lap to obtain optimum tool life.

Molybdenum can also be drilled with a solid tungsten-carbide drill for sizes up to ⅜-in. dia and over this size with a straight-flute tipped drill. Speed of 20 fpm is recommended with feed of approximately 0.002 ipr.

ANNOUNCING 4 NEW CUTTING OILS!

2 DUAL-PURPOSE OILS (lubrication and cutting)

SUNICUT 11-S for medium duty on automatic screw machines

SUNICUT 209-S for heavy duty on automatic screw machines

2 SINGLE-PURPOSE OILS (cutting only)

SUNICUT 102-S for heavy duty on automatic screw machines

SUNICUT 110-S for heavy duty service in broaching, threading, gear cutting, heading and similar applications

All four oils keep parts and tools cooler, help maintain closer work tolerances, permit longer runs between tool dressings. All are odorless and light in color. In addition, Sunicut 11-S and 209-S have high lubricating value and are nonstaining.

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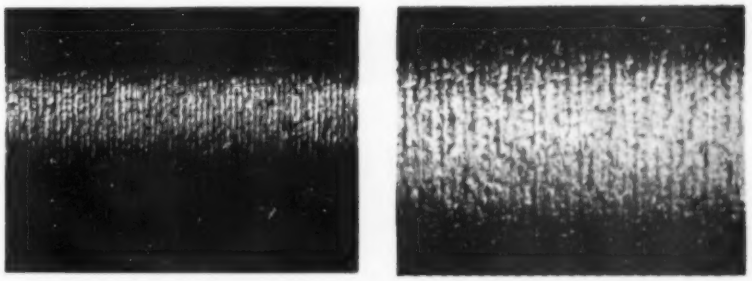
How to Machine the Rarer Metals...II

TANTALUM

Two speed ranges can be employed: Prolite I C † is recommended for machining at 150 to 250 fpm, and 15A for from 65 to 75 fpm. Feed for roughing should be 0.006 to 0.007 ipr, and about half that for finishing.

The higher speeds give better finish and much improved chip formation.

For long tool life and good surface finish, 1:15 soluble oil coolant should be copiously applied to the cutting edge. For best finish, hone the tool lightly with a fine diamond hand lap.



SURFACE FINISHES produced when rough (left) and finish (right) turning tungsten are shown here. Magnification is 10X. Tooling was as described above, with 20° top rake and work peripheral speed of 70-80 fpm

TITANIUM

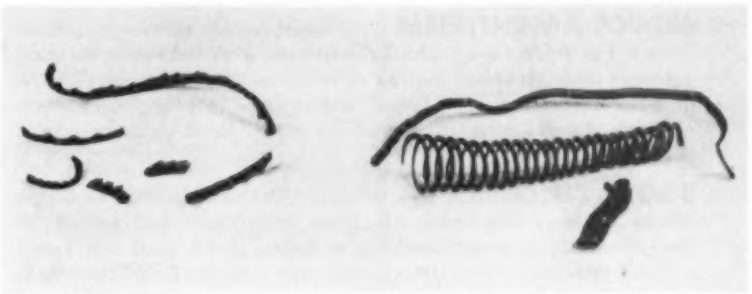
In general, components to be machined from titanium are considerably larger than those of the other materials discussed. Because the outer skin of unmachined titanium is hard, and appears to be in most cases much deeper than is normal on other metals, it is necessary to adopt two different series of cutting speeds, one for roughing to remove the outer skin, and one for machining the subsequent billet.

Prolite I C † is used to remove the outer surface, with tool angles as shown. Peripheral work speed employed is from 50 to 70 fpm with tool feed of 0.02 ipr. Negative top rake of 5° is used for this operation and depth of cut from 0.1 in. and upwards.

For subsequent machining the top rake should be 5° positive side rake, and peripheral speed of work may be increased to 180 to 200 fpm. Feed should never be permitted to fall below 0.005 ipr.

In each case the sharp cutting edge of the tool should be removed by light hand honing, and soluble oil applied liberally as a coolant.

When drilling and tapping titanium it has been found advisable to use a tapping drill of the required hole size, because it is difficult to open holes out to final size due to work hardening. Drilling speeds should be in the range of 12 to 15 fpm, with a feed of 0.004 to 0.006 ipr. The drill should be ground with increased or exaggerated clearance to prevent overheating, a tendency with titanium, because of low thermal conductivity.



CHIP FORMATIONS from low (left) and high-speed turning of tantalum. Soluble-oil coolant should be copiously applied to the cutting edge. High-speed range is from 150 to 250 fpm

ZIRCONIUM

Precautions against fire must be taken when machining zirconium, because chips will ignite if overheated. Generous tool clearance angles should be provided, and care taken to avoid worn or dull tools.

For roughing and finishing Prolite I C † recommended, using a work speed of 120 fpm for both operations. Tool feed should be 0.01 ipr for roughing, and 0.005 ipr for finishing cuts.

Depth of cut is not critical, except that light cuts should not be taken, as these produce chips in the form of fine dust, which is liable to spontaneous combustion.

†Comparable Carbide Grades

Prolite	Carboloy	Kennametal
15A	883	K6
1C	999	K8

Production News

ABOUT *Lusol*.. —THE ALL-CHEMICAL METAL-WORKING SOLUTION

FROM F. E. ANDERSON OIL COMPANY, INC. · PORTLAND, CONNECTICUT

A PREDICTION on the shop of the future

No head colds—No dermatitis—
No offensive odors—Clean floors—
Clean hands and clothing—Fresh air

Working conditions in the shop of the future will be as attractive as your office. Labor will have little cause for complaint. Production will move smoother and faster. Good housekeeping will help hurry along that happy day—good housekeeping furthered by the use of Lusol in your machine tools.

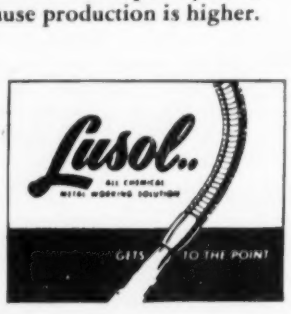
REDUCE ABSENTEEISM . . . Lusol won't irritate workers' skin; it's as safe as soap. Lusol doesn't smoke, even under extreme pressure on high-speed cutting operations; there's less likelihood of head colds and the general atmosphere is brighter. There's nothing about Lusol, in a machine that's kept clean, to cause disagreeable odors.

BOOST EFFICIENCY . . . Workers like the neatness of shops where Lusol is employed. Machines kept clean and served by this all-chemical metal-working solution don't gum up; Lusol actually removes old sludge. Floors stay cleaner; Lusol isn't oily, so you don't have the expense of non-slip compounds. Wives of workers newly introduced to Lusol have been known to say, "You must have a new job; your clothes stay so clean now."

SPEED PRODUCTION . . . Lusol's more rapid cooling permits much higher speed machining. The less frequent tool grinding and fewer grinding wheel dressings required, the elimination of degreasing operations, all contribute to faster output by men and machines. Your costs are lower because production is higher.

THIS FREE BOOK

. . . gives case histories supporting the above statements. It also tells you how to clean machines and put Lusol to work in them. For a copy, write F. E. Anderson Oil Company, Inc., Box 215-K, Portland, Connecticut.



See what long time users of Lusol say:

A sales manager on grinding wheels

"I knew about Lusol over three years ago, before I moved into this territory. Keeps wheels open so that, when we run into grinding trouble, we often recommend a switch to Lusol. It has pulled us out of many a hole."

A maker of steel and brass valves

"Well over three years ago we adopted Lusol for almost all of our machining and grinding work. It speeded up every operation. Its use saved us thousands of dollars last year alone, because of the cleanliness of Lusol. No antislip grit is needed on the floors, and the men and machines stay clean."

A manufacturer of tool chucks

"Been using Lusol for over two years on Gisholts, Blanchards, Bullard Multimatics, drills; in fact, on all conventional machining operations. Lusol is easy to mix and clean to work with. No dermatitis. Doesn't gum up the machines. The solution is clear, so grinder operators can see what kind of finish they are getting."

Foreman of a drilling department

"For four years we've had 30 to 40 girls working with Lusol on small drills. No skin trouble. The advantage of Lusol is that, on these small holes, the girls can see the drills more clearly."

An operator on a Warner & Swasey lathe

"I learned of Lusol over three years ago from my brother who works for another company, so I asked for it. Now we use Lusol for cutoff saws, drilling and milling, as well as in our Warner & Swasey lathes. No more skin troubles. The machines are clean and cutting tools last a hundred times longer than they used to."

F. E. ANDERSON OIL COMPANY, INC., PORTLAND, CONN.

TALKING SHOP

Illegal Tools?

REPORTS reaching the Carboloy Dept of GE tell of several recent burglaries on the West Coast. Floor safes were removed by drilling a series of holes in the concrete around the base in such a manner as to suggest Carboloy masonry drills. Officials at Carboloy profess to be wondering whether police permits should be obtained by purchasers of their new Live-Spiral drill. To show they aren't seriously worried, they add that metal reinforcing bars in the concrete would solve the problem. But isn't there a drill for that, too?

No Boss

IF YOU MUST start a drill at an angle to a machined surface, try casting indents at right angles to the drill axis. When the casting has been machined on major surfaces, and is to be drilled, the drills will squarely strike the as-cast indent remaining after milling or broaching, and run-out will not be a problem.

Strange Bedfellows

GOVERNMENT SPECIFICATIONS required that Hamilton Watch Co use a special oil to lubricate the fuzes it is making. Only one source was available. But careful inspection by Hamilton chemists showed that the oil supplied did not meet specifications. They set to work to develop their own and came up with a superior product, so the Government switched, and cost was reduced about 50%.

Seeking additional outlets for surplus capacity, the company sent a few samples to manufacturers of typewriters, firearms, meters, and similar equipment where a non-drying, non-spreading, low-pour-point oil could be used to advantage. The stuff is still made in miniature batches, so there was some consternation when a large gas company ordered two 50-gal. drums. It seems the ordinary oil drips on to the leather meter bellows, stiffens them up, and causes an annual loss of $50,000 a year from gas which is used but not recorded by the meters.

Nylon Faces

AT ONE of the plants of Speer Carbon Co, the men are applying a leg lotion—one of those substitutes for stockings that flourished during the nylon shortage—to their faces. The lotion seals the pores and keeps carbon and pitch out, is reported to be easily removed at quitting time. Metalworking plants are cleaner than they used to be, but there are still some operations for which this protection might be welcome.

All-Over Punch

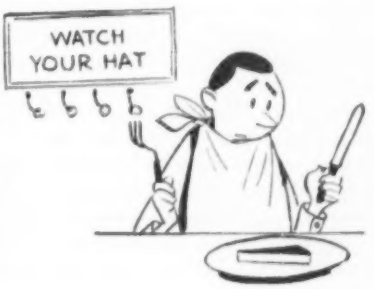
SPUN-ALUMINUM REFLECTORS require from one to as many as eight ¼-in. holes in the rim, precisely located and spaced so they will fit bezels or housings. One company developed a special punch for the job. It is essentially a table, beneath which is a heavy circular plate pushed up by a toggle from a central air cylinder. The table top (about 5 ft in dia) is graduated both radially and annularly so one to eight punches can be mounted at desired angles and radii from the center. Each punch is self-contained, including a punch and die in a hinged C-frame. The punch is tilted forward into position over the work edge, then actuated by a 1½-in. dia pin at the back, extending down through the cover plate to contact the disk. Only three holes are required at each punch location, a small locating hole at the front, a tapped hole so the punch unit can be fastened down, and the rear hole through which the actuating pin passes. To prevent punched slugs from falling between plate and disk (clearance when the punch is closed is only 1/16 in.) holes not in current use are covered with strips of black plastic tape. The table is thus highly versatile, handling up to eight holes (or more if needed) at radii up to 2 ft. The former method, punching single holes by kick press, was highly inaccurate, as well as slow.

O Isn't O in French

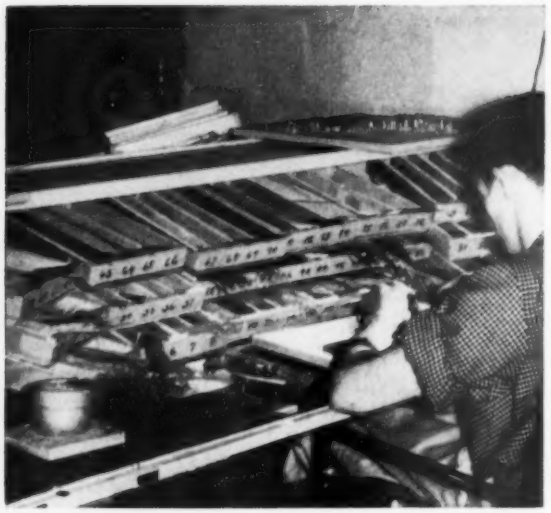
PRINTERS have queer standards of measurement, including the pica and point, but watchmakers come a close second with thirtieths of an inch. If you know the size number of your watch you can tell the diameter of the movement, because a No. 0 measures 35/30 in., and each size number indicates an increase of 1/30 in. French sizes, however, are different. They measure in lignes, and a ligne is 2.2559 mm. Thus a No. 0 French watch has a diameter of 13 52/348 lignes.

No Basic Percentage

FEDERAL AGENCIES spent $1.839 billions on scientific research and development in fiscal 1952, plan to spend $2.189 billions in fiscal 1953, according to National Science Foundation. The joker is that 72% of the '52 total was administered (Washington word for "spent") by the Dept of Defense, 14% by the Atomic Energy Commission, leaving only 14% for everything else. The 86% is mostly applied research, so basic is getting the short end, here as in industry.



COUNTING AND PACKAGING is done by a man born without arms or legs. Special tray simplifies operation which he does far faster than the people with hands. This employee commutes 25 miles to work in a car he adapted himself



HARNESS CONSOLE holds 82 wires cut and trimmed to correspond to the blueprint on the lacing board at the center. These consoles are designed at the plant; can be varied to fit any harness or cable assembly. Wirer is a paraplegic veteran working from his wheelchair

ABILITIES, INC...

In a tight labor market, one way to get additional help is to change the job to suit the man. Seldom seriously considered, this plan can open tremendous labor sources, including the physically handicapped. To prove that a physical handicap is not, necessarily, an occupational handicap, Henry Viscardi, Jr, started *Abilities, Inc*, less than one year ago. Today, on a strictly competitive basis, the company employs more than 50 people and is expanding the original building

BY WM M STOCKER, JR, ASSOCIATE EDITOR

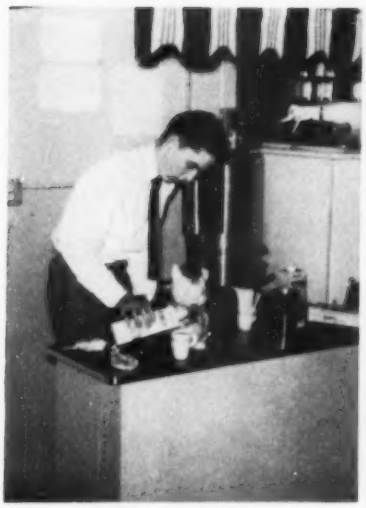
Industry makes wide use of the unit "team" system of from 3 to 10 people, each doing a few operations, to mass-manufacture or -assemble many products. If these teams are considered in terms of the people rather than of the operations—with sight, sound, touch, and arms and legs as factors, the productive possibilities are multiplied.

Job placement is almost always aimed at matching a person to a job. Applicants are interviewed with specific job openings in mind. Sometimes the people are adapted to the job by special training or orientation. By comparison, it is seldom that jobs are "interviewed" and adapted to suit the people available. Minor changes in job specifications may make the position much easier to fill.

Management is overlooking a potentially employable force of 1½ to 2 million people. These people are now unemployed, or wasting their talents, in the midst of a labor-hungry economy. They are not transients, nor are they wastrels; they are called the "physically handicapped." Only yesteryear's mental shunning of life's imperfections keeps a modern world from utilizing the many capabilities which these people still retain.

Almost any productive job can be improved to require less manual effort, less energy, less skill, and less danger. As this improvement is accomplished, the work frequently becomes more productive and profitable. When work is changed to fit people, whole new vistas are opened. Henry Viscardi can prove it many times over.

By slight alteration, many occupations can provide employment for people now considered unemployable on the fixed concept of work and workers.



SNACK BAR was installed because lunches and crutches are difficult to handle simultaneously; takes less than 6 sq ft of space and provides constant hot coffee in automatic machine. Company buys food; charges 35 cents for hot lunch. Entire proceeds of snack bar will pay for annual company banquet

RESISTANCE SOLDERING of lugs is cleaner and easier for the disabled person having hand and arm weakness. Both hands are free to manipulate wire and solder

AUDIBLE SIGNALS and Braille-calibrated dials were developed by this blind boy to test transmitting and receiving devices built in the shop. Though young, he is top man in the electronics department

new hope for new help

Reduce the lifting requirements, the standing and walking demands, or eliminate a toxic condition or a mechanical hazard. Use two or more people with one providing sight, another hearing, manual dexterity, or similar job needs. Thus, the number of persons who can safely and successfully be considered for employment will be greatly increased.

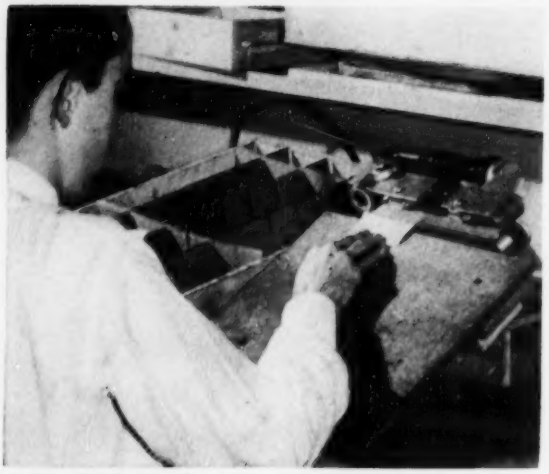
One day last September, five people reported to work at an empty garage in West Hempstead, NY. Among them there were 8 usable arms and one good leg. Two cardtables and some folding chairs loaned by the local firehouse served as office and workbench.

On borrowed capital, with the guidance of engineers from local companies such as Sperry Gyroscope and Ford Instrument, Hank Viscardi was launching a new experiment. As the man who went through army basic training on artificial limbs and, later, gave up a $15,000-a-year job to serve as executive director of Just One Break, Inc, his chances of success were excellent. (At JOB he is credited with placing thousands of disabled people in productive employment.) This was an all-out effort to prove that a legitimate business, using only physically disabled employees, could operate in free and open competition and exist completely on its ability to produce at a profit. No charity, please!

Abilities, Inc, is a membership corporation chartered under the laws of the state of New York. Its board of directors is composed of a group of disabled, successful businessmen who have joined forces with the community to establish the company. Rather than segregate the employees, the company is set up as a training ground and to demonstrate to Industry what can be done. Studies of this experience will be made available to other companies. Earlier placement methods relied too heavily upon friendship and sympathy, were ineffective as proof of potential ability.

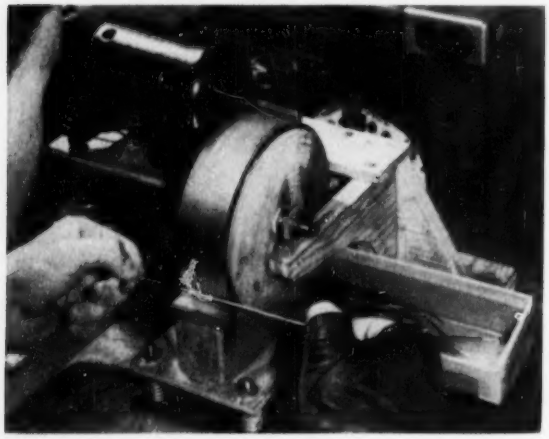
With trial subcontracts from Sperry and Ford Instrument, Hank and his crew of five went to work. The building was scrubbed and painted, wooden benches and storage racks were built, and tools were bought or made. As the work and the weeks moved along, word got around and applicants began to arrive. Each week brought from 12 to 20 people and, after a thorough placement interview, about one-third of them were hired. Some people were dismissed too, when, after three or four attempts, no job could successfully be adapted to their capabilities.

Many of the employees had never had previous gainful employment, yet much of the tooling and equipment was developed by them. There seemed to be a natural talent for overcoming obstacles. With the first contracts completed in record time, others were quick to follow. Now Abilities is sub-contracting for more than a dozen manufacturers and Hank

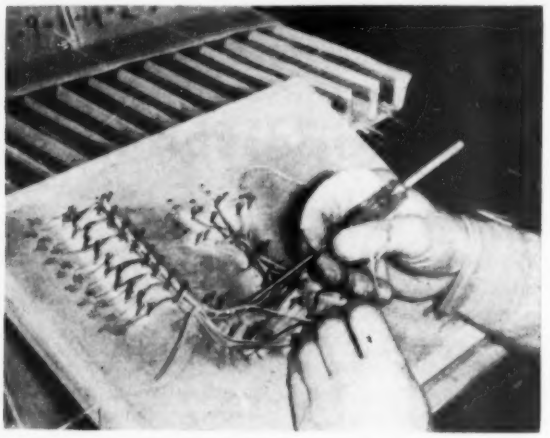


HAND-OPERATED HEAT-SEALER is fastened to bench and inclined masonite panel is attached to permit safe and efficient operation by man with polio-crippled arm. He could not lift heat-sealer but he can manipulate envelopes to be sealed

WOODEN TRACKS provide assembly line for production of radio receivers and transmitters used to control flight of model airplanes. As chassis is slid along the track, operators add components. Track also serves as holding device for soldering and staking



WIRE-SPINNING MACHINE was designed and built in the shop to prepare wire leads for harness and cable assemblies. Roller, friction driven by motor, rotates wire to simultaneously twist both finger-held ends. Wire, ready for tinning, drops into box at rear



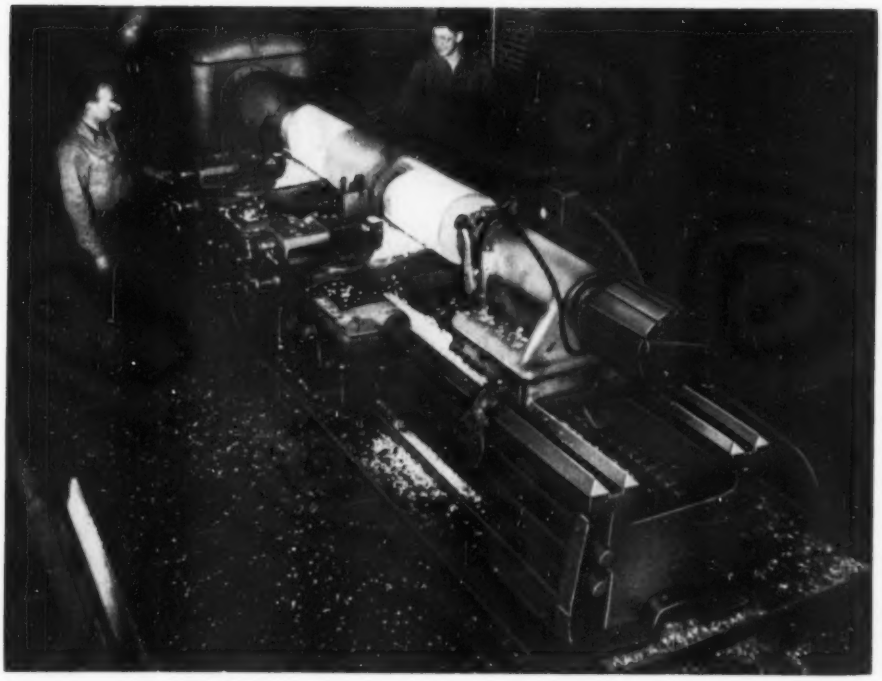
LACING TOOL was developed to assist a man with weak hands; is now used by all wire assemblers and has been copied by other companies. It consists of a plastic-handled awl bent to a hook at the point and with a piece of copper tubing inserted at the opposite end of the handle. The hook is used to pick up wires or lacing, and the tube to tamp them in place

feels that his "team" gives him the ability to underbid all competitors. His people possess the elements of greater production which cannot be bought: enthusiasm, initiative, loyalty, and devotion of heart and mind. In spite of paying prevailing wage rates and bidding in an open market, the end of 1952 showed all debts paid and a small profit. The company had been operating for less than six months.

Work at Abilities includes electronic harness and chassis assembly, small-component manufacture, sorting and packaging, transmitter and receiver assembly, and instrument testing. Before any bid is entered, the work is studied for adaptability to the personnel and conditions in the shop. Some jobs that Hank was inclined to avoid as unsuitable were specifically requested by his people and successfully completed.

Some small miracles are rewarding too. One day, a few months ago, an assembler walked into Hank's office and said, "Good morning, Boss." Mute since birth, doctors said he would never be able to speak. Since those first words, with the incentive of his first real job, the man has learned many words.

Once each month the foreman, leadmen, and president get together at a local restaurant to discuss ways and means. Hank says that his most difficult job is keeping a checkrein on enthusiasm. Plans now underway include an addition to the plant and the purchase of some machine tools to expand facilities. Finding capable help is no problem.



A 14-IN. ALUMINUM ingot 105 in. long is reduced to 13-in. dia in one pass in this special scalping lathe. Two carriages work simultaneously, each taking a ½-in. cut at 0.018 ipr. Spindle speed is 200 rpm, giving 733 sfpm

TWIN TOOLS SCALP AN INGOT

A heavy-duty 32-in. Monarch lathe recently installed at the Massena (NY) Works of the Aluminum Company of America was designed especially for increased power and higher speeds for scalping 16-in.-dia round ingots 110 in. long.

The head is driven by a 50-hp, 230-v, d-c, variable-speed motor connected directly to the shaft in the headstock parallel to the spindle. Seven gear ratios are provided in the headstock gear assembly, which, coupled with the d-c motor, gives an infinite range of spindle speeds from 9.37 to 1200. Gear-ratio selections give this series of spindle speeds: 9.37 to 18.75, 18.75 to 37.5, 37.5 to 75, 75 to 150, 150 to 300, 300 to 600, 600 to 1200. Two-to-one variation in spindle speeds in each series is adjustable by a rheostat.

The top spindle speed of 1200 is three or four time normal top speed for a lathe of this size.

All headstock ratios are easily selectable by the operator by rotating a dial on the headstock. He can vary the rpm in each range by twisting a small knob on the front of the headstock. Gear shifting in the headstock is done hydraulically and automatically. An interlock with the main drive clutch, also hydraulically operated, prevents starting of the spindle unless gears are in mesh. A red and green indicator on the headstock front shows the operator when gears are properly meshed.

When the operator starts the spindle, the hydraulically operated main drive or Pullmore clutch is cushioned so that acceleration to required speed will be dependent upon the weight of the workpiece.

The lathe was furnished with two carriages so that scalping or turning time on long ingots can be appreciably decreased. One tool starts at approximately the halfway mark on ingot length, the other at the tailstock end and both cut simultaneously, full depth, toward the head.

Alcoa engineers requested that certain other features be incorporated. One of these was the air-operated tailstock, which gets the center into the work faster, provides a predetermined amount of force which can be regulated by means of a pressure-reducing valve (and, therefore, does not depend on the "operator's feel"), and if the work heats and elongates slightly while being turned, the tailstock will still provide a constant force pushing the center into the work.

The tailstock has a 7-in. quill with a large inbuilt anti-friction center designed to carry the loads and function over the range of speeds provided by the headstock.

Maximum distance between center is 132 in., and maximum swing over the carriages is 18 in.

Rx FITTED GLASSES PROTECT MORE

When Allis-Chalmers started out to provide 100% eye protection in its West Allis Works, the company decided to include correction for defective vision in the program. This has paid off not only in fewer eye injuries but in fewer general accidents for those who received corrective glasses

THE ultimate aim for the West Allis Works of Allis-Chalmers Manufacturing Co when its "Better Vision and Eye Protection" program was started early in 1949 was to provide complete eye protection, with correction for defective vision when required, for all employees.

Prior to this date all shop employees had been furnished safety glasses. Wearing of the glasses was a matter of individual acceptance and—despite contests, poster campaigns, and other promotion—there was an average of 400 minor eye injuries a year.

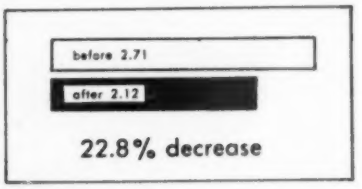
The program was developed by the Health & Safety Department under sponsorship of the West Allis Works Safety Council, after tests had shown that employees who met tentative vision standards had considerably fewer accidents than those who did not meet the standards. Initially the program was to apply only to jobs for which eye protection was required. As benefits became more evident it was extended, in 1950, to all employees.

Because employees preferred plastic frames to metal frames, the first step was to change all existing glasses as desired to plastic frames.

Before the program was started, three foreman's safety meetings were devoted to a study of structure and functioning of the human eye, the visual skills tested by the Ortho-Rater (acuity, muscle balance, depth perception, and color discrimination), the plastic frame changeover program, the types of goggles necessary for various jobs, and the Ortho-Rater test itself.

The Ortho-Rater (a Bausch & Lomb instrument for checking visual skills) was taken into each department in turn so that time lost from the job would be held to a minimum. The technicians who had been trained to operate this equipment averaged 40 to 55 tests a day. Results were recorded on IBM test cards. Hospital records were checked and the number of minor injuries reported by each man was added to the cards.

These cards were sent to Purdue University for analysis. Here a master set of cards was punched for analysis. These were compared with six standard occupational profiles. Notification cards were made up for those who met and those who failed to meet the appropriate standard. The statistical results, notification cards, and original IBM test cards were returned to Allis-Chalmers.

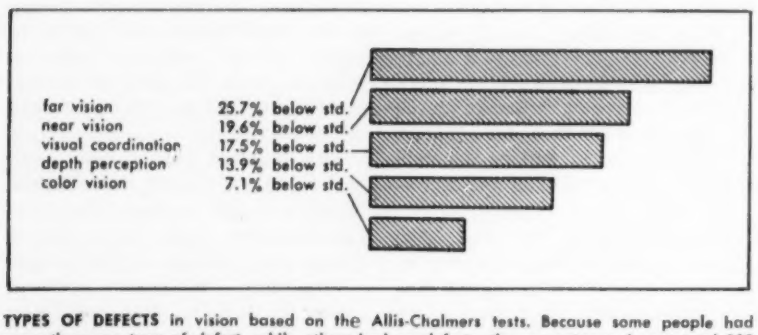


RESULTS of better vision on individual accident experience. Based on a study of 282 people who received prescription glasses for the first time

An eye clinic was established in the plant. A consulting ophthalmologist was retained to assist in planning the best way to handle refractions, obtaining the refraction equipment, and to recommend an optometrist to handle the work. The opthalmologist was retained throughout the program to examine pathology cases discovered by the optometrist.

As the program progressed the eye clinic was moved from building to building. Once initial coverage was complete, it was established in a central location. All new employees are now given an Ortho-Rater test and scheduled for the eye clinic if prescription safety glasses are required.

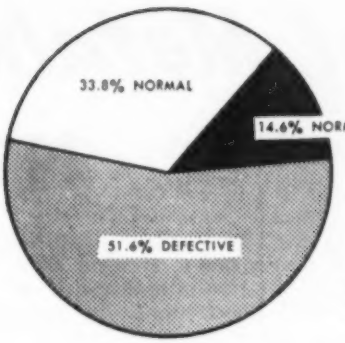
In the initial program, notification cards of Ortho-Rater results were distrbuted by foremen. When


far vision 25.7% below std.
near vision 19.6% below std.
visual coordination 17.5% below std.
depth perception 13.9% below std.
color vision 7.1% below std.

TYPES OF DEFECTS in vision based on the Allis-Chalmers tests. Because some people had more than one type of defect, while others had no defects, the percentages do not total 100

THAN EYES

By M F BIANCARDI, Manager,
Health & Safety Department
ALLIS-CHALMERS MANUFACTURING CO



MORE THAN HALF of the employees checked by the Ortho-Rater had some vision defects. Most of these could be corrected with prescription glasses

the employee already wore glasses with satisfactory correction, he was asked to bring in his prescription so he could be supplied with prescription ground safety glasses. Those who did not have satisfactory correction, or could not supply their prescription, were scheduled for a refraction at the eye clinic.

As areas were completely equipped with safety glasses, prescription ground when necessary, they were classified as 100% goggle areas. Thereafter, all employees and visitors in the area were required to wear safety glasses.

Altogether, including new employees, 28,875 Ortho-Rater tests were given from the beginning of the program through the end of 1951. The eye clinic made over 6000 refractions of persons failing to meet job-vision standards.

RESULTS OF PROGRAM

One obvious way to check the results of the program is to compare the number of disabling eye injuries before and after the program. During the seven years preceding the start of the program there was an average of 4.5 disabling eye injuries per million manhours. In the first three years after the start of the program, this average was 0.87 cases per million manhours.

But what effect did the inclusion of prescription glasses have? As indicated in one of the charts, the Ortho-Rater tests revealed that more than half the people tested had defective vision. A check was made on a group of 282 persons who received prescription glasses for the first time. They suffered 22.8% fewer injuries the year following receipt of glasses than during the preceding year.

However, there was a question as to how much of this decrease may have resulted from the glasses and how much from other factors. During 1952, further tests were made in which a control group was set up made up of people who had passed the test and not received prescription glasses.

By collating the groups, it was possible to match 77 pairs with the same age, experience, and occupation. In the corrected group accidents decreased 19.7% while the control group had an increase of 19.4%. Although this group was small, the controlled nature of the test and the size of the difference supports the conclusion that proper vision reduces the number of general accidents.

The primary purpose of the program was to reduce accidents caused by lack of protection or defective vision. Therefore, no studies have been made of its effect on production. It would seem logical to assume that those workers who had defective vision would now work more efficiently as well as more safely.

Last year a survey of 162 employees was made to determine employee reaction to the program. Of these, 38 (Group I) had previously worn glasses, while 129 (Group II) received their first glasses under the program.

Asked if the glasses helped in their work, 97% of Group I and 92% of Group II said "yes."

"He just flunked out of dental school."

News of Metalworking

SHORT RUNS . . .

• **Blind workers** are rated among the top assets of the Albert Wright Screw Machine Products Co, Emeryville, Calif, where they assemble pins and springs for artillery shell boosters. Says Company President Albert Wright, "They do the job faster by feel, and they've cut down our rejects by 100%.

• **Motorless, noiseless** electronic appliances are predicted within the next few years by RCA President David Sarnoff. Cited by Mr Sarnoff as an example is the field of home air conditioning, where he forecasts electronics will eliminate motors, blowers and compressors. Also "ripe for electronics" is the business machine industry, he said.

•**"Everybody talks** about the engineering shortage but nobody does anything about it," to paraphrase Mark Twain. Here's an exception, however. University of Dayton has come up with a three-point program of testing, interpretation and summer courses. One out of three freshmen students drop out of engineering courses by first year's end, Dayton's Dean Wehrle says, because of poor preparation. To offset this, Dayton offers engineering aptitude tests free of charge to all interested high school students. If a prospective student lacks basic courses for engineering training, or has forgotten most of what he learned, he can take U of Dayton's summer refresher courses and by fall enter the University fully prepared.

• **Demand for auto air conditioning** is really heavy in the South, Cadillac dealers report. One of Cadillac's Texas distributors says 65% of his customers are asking for the optional air conditioning with their '53 models. Cadillac is now considering equipping half of its Southern deliveries with cooling systems.

• **A 7700-lb aluminum ingot** has been heated to working temperature using only ordinary household electric power, by Aluminum Co of America. By Alcoa's new method, the ingot can be heated to 750F in 50 minutes, contrasted with the 12 hours required by conventional heating methods.

NEW PLANT &

NEW YORK — US manufacturers plan to increase capacity 16% by 1956 in anticipation of a 10% sales boost during the period, according to the Sixth Annual McGraw-Hill Survey of Business Plans for New Plants and Equipment. Highlights:

• Many firms plan to capture a larger share of the market, expecting to increase their individual sales by 13%, although they anticipate industry sales to increase by only 10%.

• Industry plans many new products and processes by 1956.

• Depreciation funds now finance a little more than half of capital spending, and the amount of funds is growing. Depreciation allowances in manufacturing are expected to increase from 1952's $5.9 billion to $7.8 billion in 1956.

• About 85% of manufacturers reporting in the survey say they spend their entire depreciation allowances for plant and equipment and will continue to do so.

• Capital expenditures are starting a trend from expansion toward modernization. About 57% of 1953's outlay will be for replacement and modernization.

• Formal capital budgets aren't being planned as far ahead this year as last, but more companies are able to plan their expenditures for the next four years.

• Capital spending for 1953 is 6% higher than that for 1952. Manufacturing firms plan a 1% increase in capital expenditure.

• More consumer goods industries are increasing their capital expenditures this year than last.

In case of changing business conditions, manufacturers have made their capital expenditure programs flexible—with more leeway for an uptrend than a downtrend. Even in a recession, businessmen say they will not cut capital expenditure more than a third below the planned 1954-56 level. On the other hand, they say half again as much as now planned for the period would be spent if industry were able to take advantage of technical improvements.

Industry plans to increase manufacturing capacity by 7% in 1953, and by an additional 9% by 1956. Biggest expansion is planned in the electrical machinery, transportation equipment and chemical industries. Automobile and machinery makers expect to expand faster than the average of all industry over the long pull, 1953-56. Exception is the steel industry's slowdown in expansion.

Production Trends

A transition from defense to civilian production, from 1953 to 1956, is indicated by capacity plans. Some defense-supporting industries, such as steel and non-ferrous metal producers, plan to complete large capacity increases in 1953. But they don't plan to add much more to production potential by 1956. Durable consumer goods industries, such as automobile and electrical manufacturers, plan sizeable increases in manufacturing capacity during the next four years. Consumer soft goods industries, such as food and apparel, expect to expand more slowly.

Capacity plans have proven to be unusually accurate in forecasting business thinking on productive needs in relation to markets. The actual level of capacity in 1952 was very close to plan.

Markets and Competition

Businessmen feel larger markets are ahead—possibly one reason why industry continues to plan new capacity. Total manufacturing sales will increase about 10%, businessmen think. At the same time management plans to increase sales of individual firms 13%. Greatest differences between company sales plans and expected industry sales were found in the automobile, machinery and chemical industries. By contrast, steel and electrical machinery companies expect their sales to correspond closely to industry growth.

New Products, Processes

With stiffening competition looming, new products and processes are assuming great importance. Here are a few planned in metalworking industries: Automotive—gas turbines for automobiles, and high-compression engines in the near future; Air-

EQUIPMENT, '53-'56

A SURVEY BY McGRAW-HILL ECONOMICS DEPT.

HOW MANUFACTURING INDUSTRIES ARE INCREASING CAPACITY

INDEX OF INDUSTRIAL CAPACITY (1939 = 100)

	1946	1948	1950	1951	1952	Planned for 1953	Planned for 1956
Steel	112	115	126	130	140	146	147
Machinery	154	200	236	271	304	331	371
Electrical Machinery	175	280	325	354	400	452	560
Automobiles	104	130	153	170	196	210	235
Transport Equipment (including aircraft)	243	250	288	328	423	503	553
Food	117	135	143	152	157	163	178
Chemicals	172	250	293	322	357	393	479
Petroleum Refining	123	160	178	185	194	204	218
Other Manufacturing	109	120	133	141	148	155	166
ALL MANUFACTURING	131	156	175	187	204	218	238

EXPANSION VERSUS MODERNIZATION

	1952		1953		1954-56	
	Expansion	Modernization	Exp.	Mod.	Exp.	Mod.
	%	%	%	%	%	%
Steel	62	38	41	59	22	78
Machinery	55	45	50	50	52	48
Electrical Machinery	57	43	60	40	49	51
Automobiles	36	64	28	72	52	48
Transport Equipment (including aircraft)	77	23	55	45	17	83
ALL MANUFACTURING	49	51	43	57	38	62

BUSINESS CAPITAL EXPENDITURES

(MILLIONS OF DOLLARS)

	Actual 1952	Planned 1953	Preliminary Plans 1954	1955	1956
Steel	1,538	1,246	748	623	785
Machinery	772	749	577	532	502
Electrical Machinery	376	549	483	395	302
Automobiles	896	1,066	949	768	693
Transport Equipment (including aircraft)	253	309	182	56	37
Food	785	879	686	677	677
Chemicals	1,451	1,364	1,309	1,228	1,350
Petroleum & Coal Products	2,596	2,908	2,792	2,588	2,530
Textiles	400	396	368	305	281
Other Manufacturing	2,927	2,634	2,028	1,817	1,817
ALL MANUFACTURING	11,994	12,100	10,122	8,989	8,974
Mining	880	1,003	832	682	692
Railroads	1,391	1,210	823	835	871
Electric & Gas Utilities	4,750	5,883	5,572	5,467	5,467
Other Transportation & Communication	2,961	3,139	3,305	2,741	2,456
ALL INDUSTRY	21,976	23,335	20,654	18,714	18,460

craft—turbojets to replace piston engines; Machinery — larger forging presses, large injection molding presses, powder metallurgy, more carbide-tipped tools; Railroads — dieselization and centralized traffic control; Steel—expansion of processing of low grade iron ore.

Capital Investment

Amount of planned expenditures is rising. Large firms plan to spend $23.3 billion on new plant and equipment in 1953, a 6% increase over 1952. Manufacturers will invest 1% more this year.

Outlook for 1954-56 shows business already projecting capital plans at a level of well over $18 billion annually. In 1953, steel, machinery and chemical industries will decrease capital expenditures somewhat. Big increases are expected from such industries as automotive, electrical machinery, transportation.

Biggest opportunities for increasing capital investment to take advantage of technical improvements are in the steel, machinery, food, chemical, and textile industries.

Depreciation

Depreciation funds are increasing, from $5.9 in 1952 to $7.8 billion in 1956, the survey shows. About 85% of manufacturers report they spend their depreciation allowances on new plant and equipment and will continue to do so. Another 5% are doing so, but plan to cut back, in order to conserve working capital or pay off debts. Remaining 10% of manufacturers do not spend all their depreciation and will not do so.

Accumulation of depreciation funds indicates where capital spending will be strongest. These funds are now a fairly small proportion of present capital spending in the basic industries. Ratio of depreciation to spending is between one-third and one-half in steel, machinery, electrical machinery, autos, etc.

Dollar amount of depreciation is growing most rapidly in these industries, due to large investment in defense facilities. The basic industries will thus have large amounts from depreciation available in 1954-56. Manufacturers of consumer goods, on the other hand, already have a fairly high ratio of depreciation to spending and their funds are not increasing rapidly.

SHORT RUNS...

• **The Soviet metalworking industry** is in the doghouse, according to radio broadcasts from behind the Iron Curtain. The reason: defective products and failure to meet production quotas. Held responsible for the industry's fiasco is a "complacent and benevolent attitude" on the part of management and lack of technical leadership. Also responsible for the Soviet metalworking fizzle: USSR's Ministry for the Construction of Heavy Industrial Enterprises' failure to meet building schedules for new plants and to repair and rebuild existing plants. The Ministry, needless to say, has been "liquidated" by the Malenkov regime.

• **Five-day conference** on Cam Design and Tool Selection for Automatic Screw Machines will be held May 18-22 at Rochester Institute of Technology. Program is divided into two conferences: one on single-spindle machines, May 18-29, and one on multiple spindles May 20-22. Details available from R D Pease, Evening Div, Rochester Institute of Technology, 65 Plymouth Ave South, Rochester, NY.

• **Japan expects to produce** some 300 tons of titanium in 1953. Largest producer, Osaka Titanium, now has a pilot plant that produces 9 tons a month, will soon build a 50-ton-a-month plant.

• **Italy's Villar Perosa Co** is building a ball-bearing works near Frosinone at a cost of $600,000.

• **Electrical machinery industry** employment totalled 393,000 workers in Dec, 1952, a gain of 85,000 since outbreak of the Korean war. Employment is expected to remain high for the next two years in this industry, says the Dept of Labor. Agricultural machinery industry employed 139,000 workers in Dec, 1952. Employment figures for 1953 are expected to gain slightly, despite a moderate decline in farm machinery output due to a drop in crop prices. Offsetting influence will be an increase in the amount of military equipment to be manufactured by agricultural machinery firms this year, according to the Dept of Labor.

HOT CUPPING OPERATIONS for forming 81mm mortar casings at Rheem Mfg Co's Ordnance Div, San Pablo, Calif. Extruding punch (right) produced 30,680 pieces, contrasted with normal punch life expectancy of 3-5000 pieces. Insert die turned out 15,000 pieces, was removed and polished. Put back into operation, it ran a total of almost 80,000 pieces before removal

Auto Engineers Exchange Views At SAE Production Forum

CLEVELAND — Eight discussion groups dealt with common production problems in as many panel discussions at the SAE National Production Meeting and Forum held here late in March.

Carbide-tool failures and grinding problems occupied the Grinding Panel. Tip cracking in service was cited as a source of high tool costs. Panel members agreed that reduction of such failures must come from a step-by-step analysis of procedure in tipping and grinding. For grinding harder grades of carbide, good results were reported with 100 concentration diamond wheels and soluble oil. Plunge grinding of chip breakers was reported to raise output from 1,000 to 12,000 tools per wheel.

Tool Finish

High quality finish on tools pays off if cratering is the principal reason for tool failure. Otherwise, though it produces more pieces per grind, it may not be worthwhile compared to grinding with SiC wheels and CO_2 coolant.

Hammer vs press discussion drew heated interest in the Forging Panel. Most of those present agreed with the view that size of work is the determining factor. Thin forgings work best in hammers because the press cannot transfer work to the press efficiently. Forgings must be designed for the press for best results. Die design is the critical factor in the impacter, with even gutter design becoming important.

Various heating methods were compared. With furnace controls, larger furnaces are required to maintain output. When men are on piecework there is likely to be trouble with men turning up the furnace to speed output.

Preventive Maintenance

The Preventive Maintenance Panel attracted much interest. With the increase of automation, breakdowns cause more disruption to production and scheduled service to prevent failure is more important. One company reported having set up complete standards for such inspections using International Business Machine cards.

Automation

Among papers at regular technical sessions was a discussion of automation programs by D S Harder and D J Davis of Ford. Recent growth in applications for hot and cold extrusions was outlined by J H Friedman of National Machinery Co.

Metal Stampers Discuss Advances In Presses, Safety, Die Life

CLEVELAND — With the stamping industry operating at an all-time high level, Pressed Metal Institute focussed attention of its Fourth Spring Technical Meeting on: (1) outlook for steel supplies and future business, (2) press guarding and safety of dies, (3) selecting the right press, and (4) minimizing die breakage. Twenty-five exhibitors at the meeting, held in the Hotel Carter on Mar 25-27, displayed equipment.

No extra sheet and strip will be in the market this year, said F R Widmer, Republic Steel, if ambitious sales plans of major consumers of stampings—notably autos—are not set back in the second half. Current output of sheet and strip is restricted to 25,000,000 tons, or 35% of total, because of need to use rolling facilities to make 5,000,000 tons of plates. In the next 10 years sheet and strip may rise to 40% of total steel production.

Autos take 35% of flat-rolled products. A softening here, even allowing 5% extra steel in market, would permit stampers to shop around for supplies. Building takes 15%, the shift is from large undertaking to many small ones, that could easily be cut back if business falters. However, a big upswing in steel consumption by this field rests upon: (1) more steel per unit, (2) commercial building free of controls, and (3) pressure for public buildings, notably schools.

New developments in press guarding interested the 285 persons attending the meeting, about 70% of these people being shop executives and engineers. Stephen V Hart, chief engineer of Electronic Control Corp, demonstrated a smaller photoelectric "curtain of light" press guard that has an electronic circuit that always "fails safe" if any defect or damage should arise. Another electronic device, the "Protectron", described by representatives of the Smith-Keser Co, measures the load on the press, or other machine, and stops the motor or trips the clutch if an increase above normal load occurs.

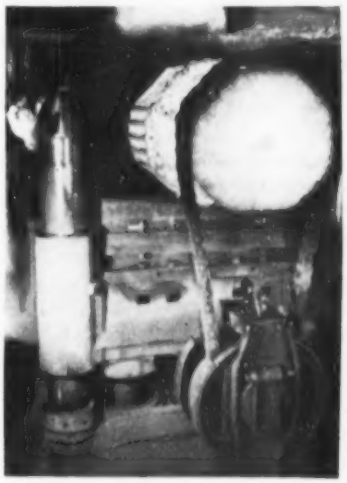
Much discussion arose about speed and length of stroke of sweep guards. W J Searjeant of Searjeant Metal Products Co said that such guards are not a hazard on small presses running up to 150 strokes per min., and short sweep, but on wide-bolster, large presses it is best to use a double-arm guard to avoid whip.

J I Karash, special project engineer, Reliance Electric, showed designs for dies that are safe to use on inclinable presses.

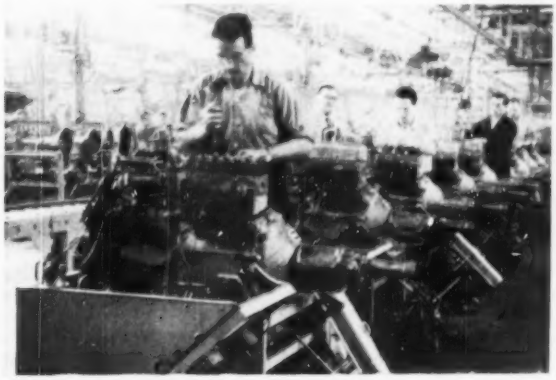
Die Breakage

Die breakage in terms of every 100 hr of production costs anywhere from 1 to 2 hrs to possibly as high as 45 hr. in many shops. Reasons for breakage in a survey made by Stanley R Cope, pres Acme School of Die Design Engr, are: design of part —1%; die design—14%, diemaking —11%, and the bulk of the remainder is due to rush or carelessness induced by piecework. Mr. Cope said that the aid of diemakers is desirable in improving dies, but that they must never be allowed to change a design without approval of the die designer, because costly die and press breakage too often follow. Melvin Verson, exec asst, Verson Allsteel Press Co, described a number of die-breakage preventive features that can be built into his company's presses at user's request.

Both National Acme Co and Greenfield Tap & Die Co showed films on drilling, tapping and counterboring, describing basic principles and showing modern tooling.



FORGING 500,000-LB. INGOT at US Steel's Homestead, Pa., District Works for the Air Force Heavy Press Program. Ingot will become a tie rod for a 20,000-ton extrusion press for aircraft parts



AUSTRALIA STEPS UP AUTO OUTPUT at General Motors-Holden's Ltd's plant at Melbourne, where annual production of the all-Australian, mass-produced 6-cyl, 21 hp Holden has been increased from 35,000 to 50,000

Business Items

Clifton Hydraulic Press Mfg Co has been formed by Michael Brodsky, formerly president and chief engineer of M & N Machine Tool Works.

Dexter Folder Co has acquired **Borg-Warner Corp's Pesco Div** supercharger business and will operate it as its **Miehle-Dexter Supercharger Division.**

A O Smith Corp announces transfer of **Burkay** commercial water heater manufacture from Toledo, Ohio, to Kankakee, Ill., where production is now integrated with Smith's **Permaglas-Heating Div.**

E F Houghton Co, Philadelphia, has created a new subsidiary, **Houghton Vix-Syn Co,** to manufacture synthetic rubber packings, and has constructed a new plant for the subsidiary at Hopkins, Minn.

H & B Machine Co, Chicago, has purchased **Karp Metal Products Co,** Brooklyn, N Y, manufacturers of fabricated sheet metal products. Karp will be operated as a division.

Western Metals Congress & Exhibition Draws Record 53,000 Attendance

LOS ANGELES—Zirconium and titanium held the spotlight at the Western Metals Congress & Exposition here Mar. 23-27, when a record crowd of 53,000 viewed more than 300 exhibits and participated in technical programs put on by ASM and six other societies.

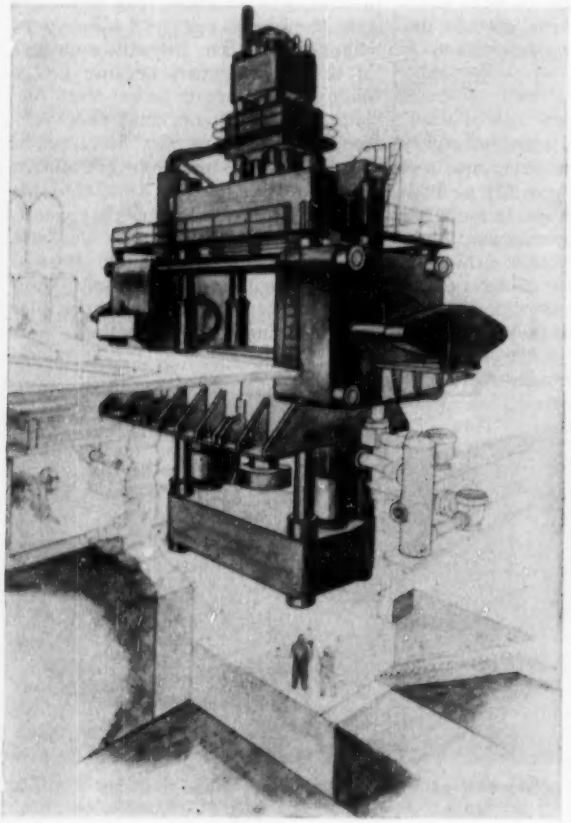
Three sessions were devoted by ASM to zirconium and its part in atomic-energy applications. Government and industrial engineers speaking at the sessions forecast an important future for the metal, because of its corrosion resistance, light weight, high melting point, strength and workability. But, they agree, zirconium still has a long way to go before it becomes practical for other than highly specialized uses.

Highlight of ASM's session on titanium was a paper on mechanical properties of titanium base alloys RC-130-B and Ti-150-A. The paper, dealing with research at Ohio State University, indicates that titanium alloys have better fatigue properties than previously reported. Instead of notched fatigue strength of 5 to 10% of unnotched strength, indicated in earlier tests, the Ohio State experiments show 40 to 50%.

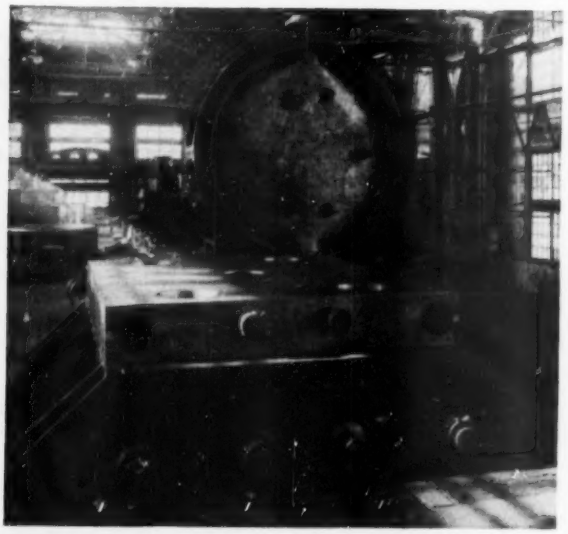
A Battelle Memorial Institute paper showed that it is possible to improve machinability of titanium, but at a cost of lowered strength levels. Insoluble phase additives, according to the paper, improve machinability, but do not give titanium free-machining qualities—such qualities must come from improved machining techniques, not from changes in composition of titanium alloys.

An American Welding Society paper concluded that forming and welding techniques for 347 stainless are largely applicable to commercial titanium.

Sessions of the Society for Non-Destructive Testing described new techniques in the use of portable X-ray equipment. Lockheed and



Largest Split-Die



WORLD'S LARGEST SPLIT-DIE FORGING PRESS, nearing completion in the Southwark shops of Baldwin-Lima-Hamilton Corp, will be six stories high, half of it in a pit below operating level (see cut-away view at left). The new pull-down type press, to be erected for Army Ordnance at Cameron Iron Works, Inc, Houston, has a press bed weighing 260,000-lb (center, above) fabricated from steel plate, some 6½ in. thick. The press will have a capacity of

Douglas, using Danish equipment, have found it possible to X-ray with a focal distance up to 7 ft, and to film 4 to 5 in. from an object. This has resulted in appreciable savings in inspecting, for example, the interior of an assembled aircraft wing —either as a final check before delivery, or as a post-flight inspection —without tearing the wing apart.

Most of the Exposition's major exhibitors displayed equipment previously shown at ASM's Philadelphia exhibition. However, some equipment was shown for the first time:

Diamond Machine Tool Co's 15-pt contact air-operated clutch, designed for its conventional OBI presses. The clutch will stop the press anywhere in its stroke.

Manco Mfg Co's portable hydraulic squeeze riveter, designed for a high-sheer aircraft rivet application but adaptable to others. High hydraulic pressures (up to 10,000 psi) permit thrust capacities to more than 30 tons. Manual valve control at the riveter eliminates solenoids at the pump. Also introduced by Manco is a portable angle-iron cutter that achieves pressures up to 30 tons.

Atlas Press Co's new feed for its 18-in. drillpress, powered by a V-belt from the drill spindle, stopping the drill if it jams. Dial gives instant feed-rate selection. Feed has steel change gears with ½-in. face, hardened stressproof steel worm, and bronze worm gear with ¾-in. face.

Mid-State Manufacturers' Weaver six-spindle drillpress with automatic variable-speed drive, claimed to save from 60 to 70% of operator's time on jobs requiring many operations on the same working center.

Hevi Duty Electric Co's Speed-Treet electric furnace for heat treating of high-speed steels. Advantages: gas-tight construction to permit controlled atmospheres; muffle-type heating chamber for conserving atmosphere, prolonging element life; and cool, quiet operation at 2600 F.

Sperry Products, Inc's surface-wave search unit that sends sound waves along the surface of metal parts being inspected to detect defects on or just under the surface for a distance of 10 ft. Unit works either on flat surfaces or shapes.

Plant Expansion

York Engineering & Construction Co and **York-Gillespie Mfg Co** have relocated all of their fabricating and machine shops, general offices and engineering departments in one large plant at 39th St and the Allegheny Valley R R, Pittsburgh.

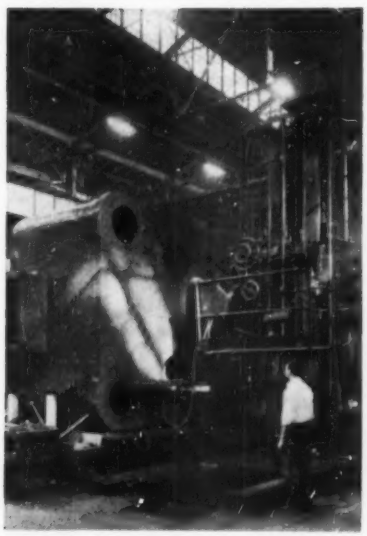
Allis-Chalmers Mfg Co is undertaking a $3 million power modernization and expansion program to meet electrical requirements for additional machine tools at its Milwaukee plant.

Aluminum Co of America is installing two aluminum extrusion presses at its Vancouver, Wash., plant at a cost of $2,700,000.

Lindberg Steel Treating Co, Chicago, has launched a $2 million expansion program which will include a new 100,000 sq ft heat treating plant at 1975 North Ave, Melrose Park, Ill.

Black & Decker Mfg Co is building a 126,800 sq ft addition to its Hampstead, Md, branch plant. The portable electric tool plant will start operations in Sept.

Forging Press Nears Completion



11,000 tons and will be equipped with a piercing ram at the top, a knock-out ram at the bottom, and two horizontal side rams for clamping vertically-split dies. Main pull-down capacity of the press will be supplied by two 51-in.-dia, 60-in.-stroke, single-acting cylinders of 5500 tons each. Two 18½-in. cylinders, with a net stripping capacity of 300 tons, will be used as pullbacks. Press has a maximum vertical opening of 12 ft and maximum horizontal clearance between side rams of 15½ ft. Top moving-down platen (being machined on a horizontal boring mill (above, left) weighs about 297,000 lb, is also fabricated from steel plate. Two side platens (above, right) are shown being assembled with horizontal columns for checking and tests. Forged-steel cylinder for horizontal ram is in left-hand platen. Each platen weighs 200,000 lb. Base, complete with cheek sections containing down stops, weighs 660,000 lb.

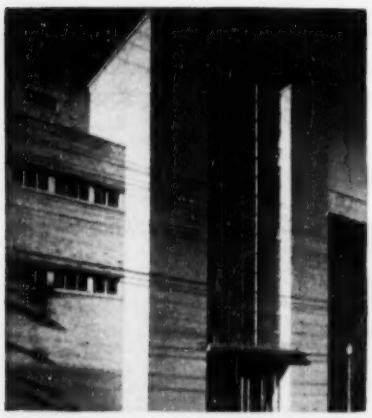
Distributors Named

Ehret & Kinsey, Chicago representatives of American Flexible Coupling Co, have opened a Milwaukee, Wis, office.

Kurt Orban Co, New York, importers of metals and industrial equipment, has opened a branch office at Miami Beach, Fla.

Harrington Wilson Brown Co, New York, has been appointed sales representative for the G A Gray Co's line of milling, boring, and drilling machines in eastern New York, southern Connecticut, northern New Jersey, and northeastern Pennsylvania.

Mapes & Sprowl, Inc, Union, NJ, has been named distributor in the New York City area for Reynolds Metals Co's aluminum mill products.



Consumer Applications Highlight International Magnesium Exposition

WASHINGTON — More than 6000 visitors toured the 41 displays of the first International Magnesium Exposition the first day. Held at the National Guard Armory here Mar 31 to Apr 2, attention was divided between the many military applications displayed by the military services and the peacetime applications shown by magnesium-producing exhibitors from the United States, Canada, England, and Germany.

Magnesium Auto Body

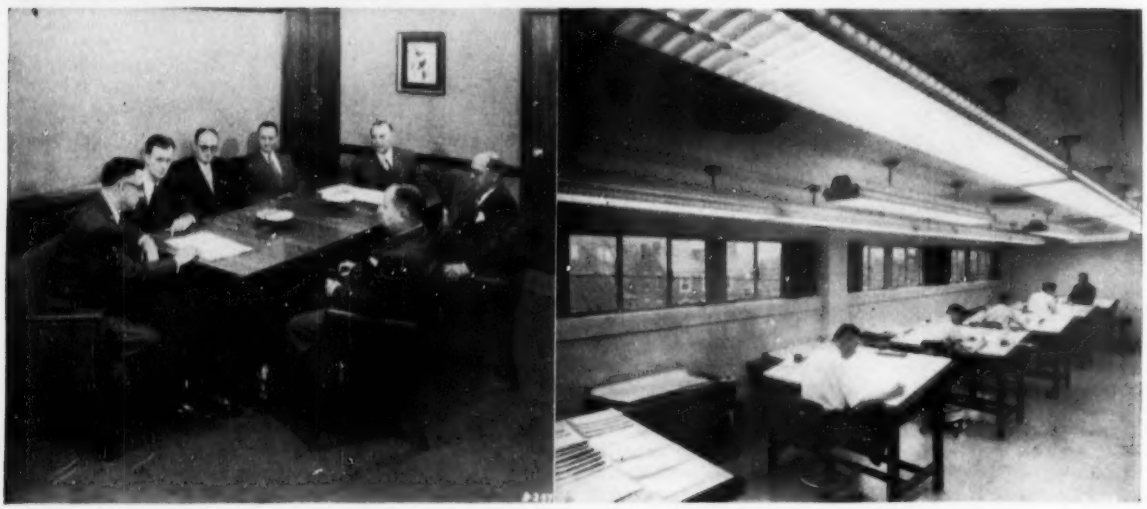
An auto body of 16-gage magnesium mounted on an Allard chassis was exhibited by Essex Aero, Ltd, Gravesend, England. Weighing only 132 lb, the body is mounted to the chassis at three points on each side and can be completely removed in 4 min by two men.

R J Cross, managing director of Essex Aero, said the car had been driven about 6000 miles and has given no trouble so far. He feels that it represents a better solution than plastic to providing weight reduction. Magnesium is lighter than a plastic body, he says, can be cost-competitive with plastic, and would involve fewer changes from present manufacturing methods. It is interesting to note that bumpers are bare magnesium, polished with body paint to retain a gloss in service.

Essex Aero also displayed a hospital bed with sandwich construction, and a variety of materials-handling equipment including a beer crate of aluminum and magnesium. The crate is being produced at a rate of 2000 per day.

Magnesium Elektron, Ltd, Manchester, England, concentrated their display on castings, including the transmission housing for the Ferguson tractor. R G Wilkinson of MEL, reported that they have been undertaking research, both in alloys (they have pioneered in the development of zinc-zirconium alloys) and in their efforts to find a thermal reduction process because of the high power costs in England. Their ZT1 alloy (magnesium - zinc - zirconium - thorium) is for castings to be used in the range 500 to 650 F.

LODGE & SHIPLEY'S NEW ADMINISTRATION BUILDING, adjoining its Cleveland plant, is a striking example of functional design. Fronting on Cleveland's Colerain Ave (above, left), the building contains 33,000 sq ft of air conditioned, fluorescently lighted, acoustically tiled office and engineering facilities (below, right). Below, left: meeting in the new administration building for the first time recently was Lodge & Shipley's executive board. Left to right are: J Robert Cuni, director of Industrial Relations; Thomas T Kling, works manager; Ralph W Miller, secretary and controller; Carl F Pabst, plant manager; William L Dolle, president and treasurer; Frank A Fritsch, chief engineer; and J Herbert Myers, vice president and sales manager



ONE OF FIVE MANUFACTURING BAYS at Norton Co's new Grinding Machine Division plant, Worcester, Mass. Craneways of floor operated cranes are independent of building structure. Alundum aggregates have been added to concrete floor to prevent slipping. Plant has 40-60 ft-candle semi-direct lighting

Open House Launches $6 Million Norton Grinding Machine Expansion

WORCESTER, MASS. — A week-long open house marked the unveiling of Norton Co's $6 million expansion of its Grinding Machine Division here, beginning Mar 31. The new 740 x 300 ft plant provides increased capacity for production of Norton's complete line of 45 types of precision grinding and lapping machines. Also shown for the first time was a 360 x 100 ft office building and parking lot adjoining the plant.

Built to meet defense effort demands, the new plant features straightline production methods, many new types of machine tools, special materials handling equipment, air-recirculating dust control, and a forced ventilation system that provides three complete air changes per hour.

The plant, of one-story construction, provides 275,000 sq ft of working space, increasing Norton's machine tool manufacturing capacity by about 50%.

Raw materials are received at one end of the plant, proceed through five 60-ft bays to the assembly and shipping area, reducing materials handling distances 50 to 90%. For example: a heavy grinding machine wheel slide travels only 554 ft, instead of 3140 ft, as before.

Floor-operated cranes, supported on craneways independent of the building structure, have supplanted electric trucks in many materials handling operations. Hand trucking is at a minimum.

Plant's exterior is of cinder block faced with brick and interior construction is designed for a minimum of upkeep. A 15,000 sq ft mezzanine houses locker rooms, washrooms, a power sub-station and miscellaneous facilities. A public address system allows paging of supervisory personnel. Also included in the plant is a modern cafeteria that can handle 386 people at a sitting—about one-fourth of the Grinding Wheel Division's employee total.

FOREIGN PLANTS FOR BRAZIL

Brazil's metalworking industry is getting a shot in the arm from European firms proposing to set up plants in that country. Among proposed European-financed projects: a typewriter plant to be set up by Switzerland's Paillard Co; a factory for producing lamp outlets, to be built by Sweden's Aktiebolaget Olof Myberg; an Austrian-capitalized plant for adapting steam locomotives to diesel operation.

GERMAN MACHINE TOOL FIRM ESTABLISHES US AFFILIATE

NEW YORK — American Schiess Corp has been formed here by Europe's largest builder of heavy machine tools, Schiess AG, Dusseldorf, Germany, to provide technical assistance to automotive, aircraft and other metalworking industries using Schiess equipment in the United States and Canada. Headquarters are at 205 E 42nd St, New York. Plans are to establish engineering offices and servicing facilities in Pittsburgh, where replacement parts will be stocked, Schiess equipment will be demonstrated and Schiess engineers and mechanics will be permanently located. Robert C Zeile, formerly Pennsylvania district manager of Kurt Orban Co, Inc, US Distributor for Schiess, has been appointed manager of the Schiess Pittsburgh operation.

NMTBA ANNOUNCES 1952 MACHINE TOOL AD AWARDS

CLEVELAND — Awards for outstanding advertisements in the machine tool field for 1952 will be made April 8 in New York at the spring meeting of the National Machine Tool Builders Association, on the basis of judging by NMTBA's Advertising Committee here March 24. Some 48 companies entered a total of 222 advertisements in the competition—of these one advertisement was adjudged the winner and one the runner-up in each of six categories. Winner is listed first in each:

- To announce a new machine or model: Ex-Cell-O Corp, Detroit; Landis Tool Co, Waynesboro, Pa.
- To describe outstanding features of a machine tool: Landis Tool Co; Van Norman Co, Springfield, Mass.
- To acquaint the field with a company's complete line, or section thereof: Monarch Machine Tool Co, Sidney, Ohio; Landis Tool Company.
- To show a case history or testimonial: R K LeBlond Machine Tool Co, Cincinnati; National Acme Co, Cleveland.
- To build company or industry prestige: Warner & Swasey Co, Cleveland—both awards.
- To render a service to the customer by giving information or instruction: Bryant Chucking Grinder Co, Springfield, Vt; Gardner Machine Co, Beloit, Wis.

Roger E Bremer

Russell R Rees

Oliver E Rodgers

Henry E Sanson

Names in the News

Roger E Bremer, formerly purchasing agent for Lincoln-Mercury, has joined Packard Motor Car Co as director of purchasing. Mr Bremer succeeds **Russell R Rees,** head of Packard purchasing since 1945 and a Packard executive for 38 years, who is retiring. **Oliver E Rodgers** has been appointed chief engineer of Packard's Jet Engine Div. Mr. Rodgers was formerly assistant manager of Westinghouse Electric Corp's Gas Turbine Division.

Orren S Leslie has been elected vice president in charge of manufacturing of Fairbanks, Morse & Co. Mr Leslie joined the company in 1951 as works manager of the Beloit, Wis, plant; a year later he was appointed manager of manufacturing. **G J Malone,** formerly controller, was elected vice president-controller.

E Halsey Brister has been appointed director of product development and quality control for Bay State Abrasive Products Co. Formerly sales manager, Mr Brister is succeeded in that post by **Elden L Auker** who has been serving as Detroit district manager.

James R Cummings has been made director of engineering and sales for Stamco, Inc. Before joining the company, Mr Cummings was associated with Reynolds Metals Co in Richmond, Va.

H R Lobdell has been elected vice president in charge of production and field service of Machinery Mfg Co, Inc. Prior to joining the firm in 1950, Mr Lobdell was associated for ten years with Standard-Knapp Div of Emhart Mfg Co.

James O Clevenger has been named sales manager of general industrial products of Westinghouse Electric Corp. Mr Clevenger has been a member of the firm since 1927, most recently serving as manager of the welding dept at Buffalo. He will make his new headquarters in Pittsburgh.

Gerry T Attridge, formerly general manager of Lovejoy Tool Co, has been elected vice president. Mr Attridge has been a member of the organization since 1946.

Albert B Diss has been appointed vice president and general manager of The Watson-Stillman Co, Div, H K Porter Co, Inc. Mr. Diss will head all manufacturing and sales operations. He joined the firm in 1950 as manager of manufacturing operations, and last year was elected vice president.

G M Stickell has been appointed to serve as general manager of the Landis Machine Co. He has been vice president of the company since 1942 and will continue to serve in that capacity. Mr Stickell succeeds **J H Elliott** who formerly served as general manager in addition to his duties as president; he will continue to head the company.

William Goodrich has been appointed factory manager of The Die Supply Co; he moves up from his post as supt of tools and equipment. **Louis O Taber,** newly-named customer service manager, was formerly production supt. **Arthur Hazeldine** has been promoted from assistant to the production manager, to production control manager.

Henry E Sanson, president of Henry E Sanson & Sons, Inc, will head a new company, Henry E Sanson & Sons Mfg Corp, which will manufacture specialty industrial oils and chemical products for the metalworking fields. Executive vice president is **Henry E High,** formerly with E F Houghton & Co. Vice president in charge of production is **Harry J Lavery,** also a former E F Houghton employee, until recently plant superintendent for W H & F Jordan Mfg Co.

Calvin A Burton has been appointed assistant to the president, Lamson Corp. Mr Burton, formerly conveyor sales manager, will be succeeded by **Edward H Woodberry. Gail D Beaver,** until recently materials handling consultant, has been named product sales manager; he will assume Mr Woodberry's previous responsibility for pallet loader sales, together with other product sales.

Edwin H Walker has been named president and general manager of McKinnon Industries, Ltd, subsidiary of General Motors, St Catharines, Ontario. Mr Walker succeeds **Thomas J Cook,** retiring after 28 years with GM, and ten years as president and general manager of McKinnon.

Joel A Jannenga has been named chief engineer of Greenlee Bros & Co. He succeeds **Judson H Mansfield,** retiring after 47 years with the firm. Mr. Mansfield will continue to serve the company as an engineering consultant.

Armand A Probeck has been elected vice president of Snap-Tite, Inc. Prior to his appointment, Mr. Probeck headed his own firm with offices in New York, Boston, Philadelphia and Washington.

John Stolarz

Francis J Sehn

John Cinkosky

M S Phoenix

John Stolarz, formerly general sales manager for Rockwell Mfg Co's Delta Power Tools Div, has joined DeWalt, Inc, American Machine & Foundry Co subsidiary, as industrial sales manager.

Francis J Sehn, former Detroit district sales engineer for Clearing Machine Corp, has been appointed vice president in charge of sales for Sahlin Engineering Co, Detroit.

Ralph E Knowles, formerly works manager, Armament Div, has been appointed division manager at Cincinnati for Emerson Electric Mfg Co, succeeding **Harry C Levenson,** who resigned recently.

Dr William F Ballhaus has been appointed chief engineer for Northrup Aircraft, Inc, Hawthorne, Calif. Dr Ballhaus, who most recently has been assistant chief engineer in charge of Northrop's analytical activities, has been with Convair and Douglas in executive engineering capacities. Dr Ballhaus will be succeeded in his former position by **F A Ford,** formerly with North American Aviation, Inc.

Maurice H Hobbs has been named assistant manager of Westinghouse Electric Corp's Switchgear Div, **Charles P West,** manager of engineering; and **Charles E Bickham,** manager of order service.

Durando Miller, Jr, has been appointed assistant technical manager for Permutit Co, New York. He was formerly on the Staff of Permutit's Technical Dept.

James P Creech has been named Southwest representative for Consolidated Industries, Inc's line of lightweight forgings and castings for aircraft. Mr Creech was formerly with Chance-Vought Aircraft Co.

John Cinkosky, former sales vice president for Centric Clutch Co and recently eastern sales manager for Steel Products, Inc's Mercury Clutch Div, has been named head of Airborne Accessories Corp's Industrial Sales Div, Hillside, NJ

William B Morse, formerly assistant Detroit manager for Fairbanks, Morse & Co, has been named manager to succeed the late E J Hay. Also named to new positions by F-M are: **Frank M Mason, Jr,** to be coordinator of US Government Business; **J F Weiffenbach,** to chief product engineer, Mfg Div; **W E Watson,** to works manager, Canadian Locomotive Co, Ltd, a subsidiary; **J R Walsh,** to manager of F-M's new Kansas City, Kan, plant; and **W P McAnally** to manager of the Stuttgart, Ark, Works.

Paul Forsythe, supervisor of design and application engineering, and **John Morris,** supervisor of design engineering for Western Gear Works, have been named staff engineers to correlate and direct engineering activities of Western's six plants, in addition to their present duties. The company also announces the return of Vice President **Charles F Bannan,** who has been with NPA in Washington.

John Persich has been appointed assistant superintendent of the Los Angeles Plant of US Steel Corp's US Steel Products Div.

A W Jacobson, formerly experimental department manager for Boeing Aircraft Co, has been named manufacturing manager for pilotless aircraft, and will report to **Lysle A Wood,** newly named director of pilotless aircraft for the company. Mr. Jacobson will be succeeded as experimental department manager by **W E Ramsden.**

M S Phoenix has been appointed chief engineer for F E Anderson Oil Co. Mr Phoenix was formerly on the company's Lusol tool engineering staff.

Jack W Harvey, formerly assistant sales manager in charge of the Chicago territory for Manco Mfg Co, Bradley, Ill, has been appointed sales manager.

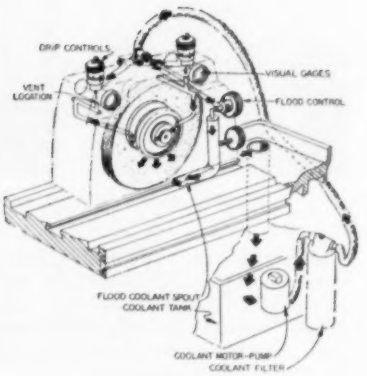
August B Hoefer has been elected vice president of Udylite Corp, Detroit, and vice president and general manager of Udylite's subsidiary, Frederic B Stevens, Inc, Detroit. He was formerly Udylite's New York manager.

W B McMillan, president and director of Hussmann Refrigerator Co, has been elected a director of Wagner Electric Corp, succeeding the late C B Fox.

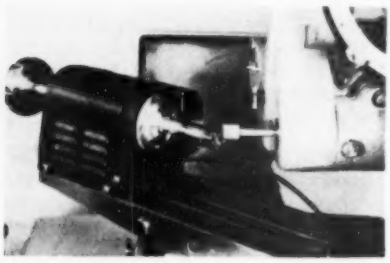
H W Barth, appointed chief engineer, heads a list of new executives at General Motors Corp's Cleveland Diesel Engine Plant. The others are: **Harry Heinzen,** from chief electrical engineer to chief engineer — electrical; **Eric Brater,** to assistant chief engineer—mechanical; **W E Brill,** to assistant chief engineer—design and development; **Horace Trainer,** to diesel representative at Cleveland; **Donald F Rogers** to service parts manager; and **K O Keel,** to government contract sales manager.

Karl Goetz has been named manager of the San Francisco branch of Kurt Orban Co, distributors of German-made machine tools. He was formerly with Friden Calculating Machine Co, Inc, San Leandro, Calif, for two years. Mr Goetz will make his headquarters at 3036 Telegraph Ave, Berkeley.

New Shop Equipment



Coolant flow passes through three metering valves—two for the sides of the wheel, and one for flood grinding. High-speed spindle attachment (below) replaces regular wheel, and can be positioned vertically as well as horizontally



Toolroom Surface Grinder Has Broader Operating Scope

Model D6 toolroom surface grinders have been designed to receive attachments or incorporate additional components that broaden the scope of surface-grinder applications. Tables have been lengthened over previous models in the line. The D6-3, for example, has a 6x24-in. work area, compared with the previous 18 in. Full hydraulic crossfeed is standard.

The coolant system provides a choice of "Cool Grinding" (coolant applied to the sides of the wheel and flowing through the wheel from centrifugal force), flood cooling, or a combination of the two.

The "Cool Grinding" system is now a part of a common-filter, recirculating system. A single hose supplies three valves—two for the sides of the wheel and one for flood grinding —with metering sight-feed valves to divide the flow as desired.

Wheel-guard cover is hinged and can be raised for wheel removal. Coolant tank, combination coolant pump and motor, and filter, are combined in one unit mounted on casters. Three compartments provide successive settling basins with oil rough-screened, then filtered.

A high-speed-spindle attachment belt, driven from the grinder spindle, can be swung from horizontal to vertical position for broach sharpening and other applications.

Infinite variation of spindle speeds is possible within certain ranges. The low-speed range is 400 to 4000 rpm, belt driven from a dc motor with Thymotrol control. The high-speed range, a frequency-sensitive ac motorized spindle, can be 4000 to 16,000 rpm or 5000 to 20,000 rpm.

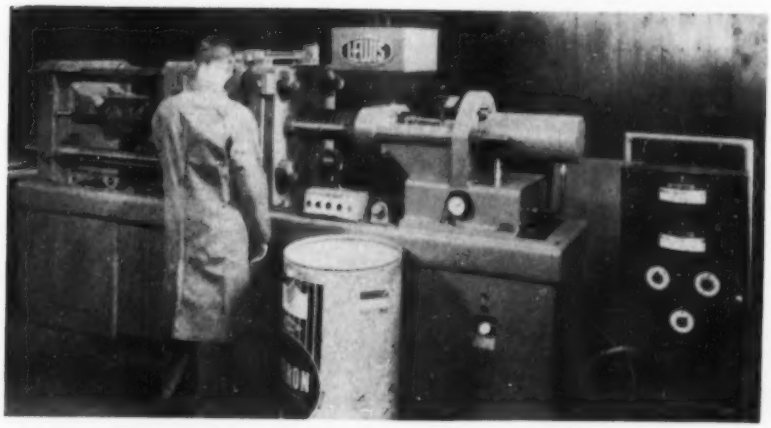
Precision-ground elevating and feed screws are said to permit grinding directly to calibrations of the feed handwheels. Calibrated slip rings on the wheels can be set after the initial cut.

The DoAll Company, 254 N Laurel Ave, Des Plaines, Ill

Bowser units for cold treatment of metals are available with ranges from –50 to –200 F, or lower. Treatment is said to increase cutting tool life as much as 500%. Distortion and cracking resulting from grinding can be eliminated, and dimensions of precision parts, gages, and tools permanently stabilized.

Bowser Technical Refrigeration, Terryville, Conn.

Materials and Parts



Plastic Injection-Molding Machine Has 20,000-psi Injection Pressure

Lewis plastic injection-molding machine incorporates a method of clamping the molds together known as Hydra-Lock, as well as multiple packing of the injection cylinder and a quick mold release for nozzle clearance. The manufacturer reports the machine so simple in design and operation that original cost is low and operator training a matter of hours.

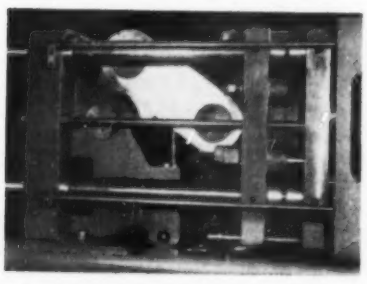
The machine employs an externally heated, straight-bore injection cylinder. Plastic enters by gravity and is packed into the heating section by multiple-injection strokes. Electric control circuits are set to starve the heating chamber by smaller amounts each stroke, the plunger advancing further each stroke until it strikes a limit switch which causes its return to a point of maximum retraction. Injection pressures are adjustable from 0 to 20,000 psi.

Hydra-Lock clamping system utilizes a toggle linkage which advances the platen carrying the movable-half of the mold. When the mold faces are open only a fraction of an inch, the toggle mechanism serves as a locking device. Incorporated in the platen structure is a 16-in.-dia hydraulic cylinder, actuated by the control circuits, which does the final closing and supplies the final locking pressure of 200 tons. It is said that the short stroke of the clamping cylinder and the liberal clearances in the guides permit quick lineup of the mold faces.

The molding cycle is started by closing the safety gate. Platens are automatically advanced, the cylinder closes the mold, and the plastic is injected. During the curing cycle the prepacking of the injection cylinder takes place. At the end of cycle, molds open and remain open until the operator again closes the safety gate.

Actual capacity rating of the machine is determined by the molds. Injection cylinder has a plasticizing capacity of 60 lb of polystyrene per hour and shots weighing 6.8 oz have been molded 2.5 shots per minute.

Lewis Welding & Engineering Corp, Bedford, Ohio



Toggle linkage and Hydra-Lock assembly of Lewis plastic injection-molding machine. The toggle linkage advances the platen until the mold faces almost close, then locks. Final locking pressure of 200 tons is supplied by 16-in.-dia hydraulic cylinder.

... INCLUDING

Roll grinder with new vitrified bond materially reduces preparation time for final mirror-finish grinding .....page 206

Production-model drillpress, with one to four drillheads is designed for multiple operations..page 207

Radial-arm drills for the aircraft industry are available with dual spindles with speeds of 5000 and 8000 rpm.....page 208

Allen wrench set is contained in a knife-like folding handle carrying five sizes.....page 210

Automatic machine will clean and lubricate sheet and blanks for drawing operations at speeds up to 55 fpm.....page 218

Heavy-duty drilling machine has power, hand, or hydraulic feed; drills holes to 1⅛-in. dia in cast iron .....page 220

Horizontal boring and milling machine drills and bores holes from 3 in. to more than 10 ft in diameter .....page 222

... and in April 27

Thread-milling machine applies adjustable-speed hydraulic motors to cutter-spindle and work-spindle drives.

Precision toolroom lathe has head with sixteen selective spindle speeds, using only fifteen gears.

Norton Vitrified G-Bond Releases Dull Abrasive Grains

G-Bond Recommendations for Crush-Trued Thread Grinding

WORK	TYPE OF GRINDING	WHEEL SIZE	
		14-IN. DIA AND SMALLER	LARGER THAN 14-IN. DIA
5 to 10 Pitch, hardened steel	Surfacing	38A120-K9VG	32A120-K9VG
	Cylindrical	38A120-N9VG	32A120-N9VG
	Centerless		32A120-Q9VG
11 to 14 Pitch, hardened steel	Surfacing	38A150-K9VG	32A150-K9VG
	Cylindrical	38A150-N9VG	32A150-N9VG
	Centerless		32A150-Q10VG
16 to 24 Pitch, hardened steel	Surfacing	38A2203-K9VG	32A2203-K9VG
	Cylindrical	38A2203-N9VG	32A2203-N9VG
	Centerless		32A2203-Q10VG
24 to 32 Pitch, hardened steel	Surfacing	38A320-K9VG	A320-K9VG
	Cylindrical	38A320-N10VG	A320-N10VG
	Centerless		A320-Q11VG

G-Bond Recommendations for Tool and Cutter Sharpening

Milling Cutters
Large—(Cup wheel), 32A46-K8VG
Small—(Cup wheel), 32A60-K8VG

End Mills
(Dish wheel)—32A60-I8VG
(Cup wheel)—32A60-K8VG

Hobs
(Straight wheel, B face)—38A60-J8VG
(Dish wheel)—38A60-K8VG

Reamers
Cup or straight wheel—32A60-K8VG

Broaches
(Dish wheel)—38A80-I8VG

Drills
Large—19A46-M5VG
Small—32A80-J8VG

Tools (Single-Point)
Small—Roughing, (6- to 12-in. wheels)—A46-M5VG
Finishing, A60-M5VG
Large—Roughing (14-in. wheels and larger)—A36-P5VG
Finishing, A46-N5VG

G-Bond Recommendations for Surface Grinding

Soft Steel	
Segments	19A30-I8VG
Cups & cylinders	19A24-H8VG
Straight wheels	19A30-J8VG
Hard Steel	
High-Speed Steel	
Segments	38A46-H8VG
Cups & cylinders	38A46-H8VG
Straight wheels	38A46-I8VG
High-Carbon, High-Chrome Die Steel	
Segments	38A46-H8VG
Cups & cylinders	38A46-G8VG
Straight wheels	32A60-H8VG
Stainless Steel	
Free Machining	
Segments	32A36-G8VG
Cups & cylinders	32A36-G8VG
Straight wheels	32A46-H8VG
Hardenable	
Segments	38A36-H8VG
Cups & cylinders	38A36-H8VG
Straight wheels	38A46-I8VG

Vitrified G-Bond, developed by Norton, is reported to hold abrasive grains just long enough to keep the grinding surface at peak efficiency. Carrying the marking symbol VG, it is suitable for 32 or the other Alundum abrasives.

Freer cutting action can normally be obtained by switching to a bond of softer grade, but this may strip good, unused abrasive particles from the wheel. G-Bond is claimed to have the ability to break down at just the right time in the grinding cycle—without completely shedding the outer layer—thus are cooler cutting than any comparable wheels with normal vitrified bond.

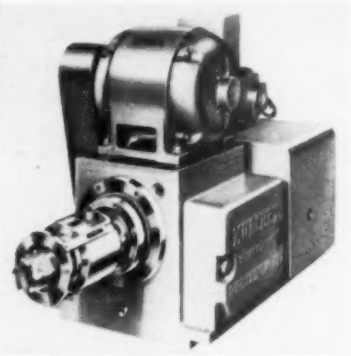
Other factors by which a grinding wheel is judged have been checked in field tests. These are reported to show that the G-Bond is also capable of faster cutting, longer wheel life, and better finish. It is also reported to hold its shape or form better, especially when a harder grade can be substituted for that normally used.

Some adjustment of grinding conditions and of grain and grade specifications may be necessary with the new wheels. Norton recommendations for a number of operations are shown in the tables.

Examples of the field tests reported by Norton include surface grinding small steel parts on a vertical-spindle machine with segment wheels, 32A24-18VG; as compared with the best previous specification the user reported 52% longer life, 24% faster rate of cut, no change in surface finish.

The properties of the new bond first became evident in thread grinding with crush-trued wheels. On one job, both 300 and 400 series stainless-steel studs, ½- to 1-in. dia and up to 3-in. length had to be ground from the solid with 32-pitch threads for jet engines with a 14x1x5-in. crush-trued wheel. Difficulty in maintaining the form was reported until the 38A2203-010VG wheel became available. It is reported to maintain the proper root width and to grind several hundred studs between recrushings.

Norton Co, Worcester 6, Mass

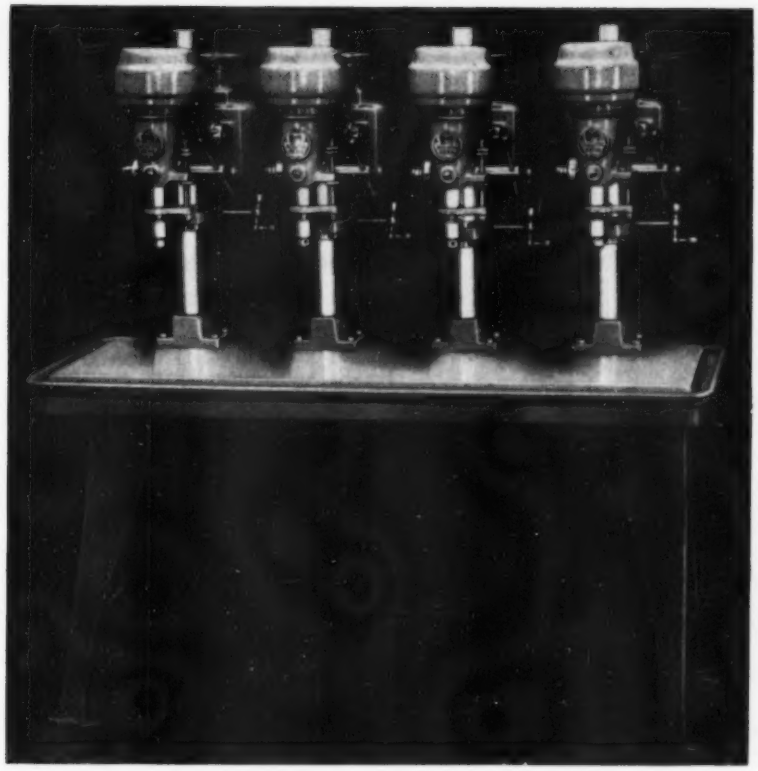


Precision-Pak Threading Unit For High-Production Rate

Murchey Precision-Pak threading unit was designed to meet requirements of high precision and production. A fully automatic unit, it incorporates such features as direct precision lead, rapid return of tool spindle, variable speeds, flexibility of application, and, it is said, low cost of maintenance. A hardened and ground spindle is driven by a 3-hp motor. Precision lead is maintained through the 4-in. lead travel by a hardened and ground leadscrew and collapsible leadnut head mounted directly on the rear of the spindle. At end of feed travel, leadnuts are automatically disengaged and rapid spindle return is obtained through a planetary gear clutch.

Used in conjunction with Murchey collapsible taps and self-opening die heads, it is suited for high production of such threading applications as shell tapping, rocket threading, aircraft, automotive, and similar operations.

The Sheffield Corp, Dayton 1, Ohio



Production-Model Drillpress Has From One to Four Heads

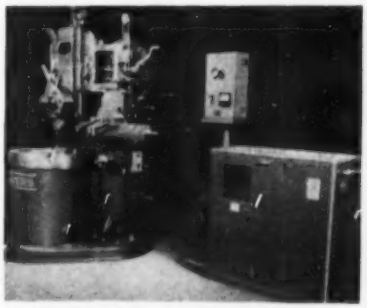
South Bend production-model drillpress is said to be highly efficient on long production runs and to handle shorter runs with ease. The machine was designed for multiple operations involving drilling, tapping, reaming, burring, and chamfering. Four types, equipped with from one to four drillheads, are available.

Each drillhead is essentially South Bend's 14-in. precision-model drillpress. A belt-tension release provides quick speed changes. The free-floating spindle eliminates side thrust and whip and sealed bearings simplify maintenance. A drillhead-positioning attachment gives each assembly 4 in. of vertical adjustment at any one setting. The attachment can be set at any point in the column. After locking in place it swivels around the column with the drillhead and moves the head up and down by enclosed worm gearing. A work-light built in each drillhead prevents shadows around the work area.

The machined, ribbed worktable has coolant grooves sloping to the rear where a built-in trap prevents chips from clogging the coolant drain. Worktable can be set on a bench or mounted on legs.

Worktable areas range from 14x15 in. for the single-spindle model up to 14x55 in. Maximum capacity of the unit is 7 in. from spindle to collet and 18 in. from chuck to table. Spindle speeds range from 720 to 4325 rpm. Motor is 1/3 or 1/2 hp.

South Bend Lathe Works, 425 E Madison St, South Bend 22, Ind



Adjustable Speed Drive For Rogers Vertical Turret Mill

Adjustable drive for Rogers "Perfect 36" vertical turret mill provides table chuck speeds to 212 rpm. The power unit governs motor speed and eliminates the 8-speed transmission, clutch, brake, and lever controls on the standard Rogers model. Equipped with rheostat control, the control box has start, stop, and jog pushbuttons and will set or change motor speed. Speed ratios of more than 16:1 are provided and speed may be changed while machine is in operation. Dynamic braking for quick stopping is controlled by the stop button and the motor may be started or stopped without changing the speed setting.

Rogers Machine Works, 1400 Seneca St, Buffalo 10, NY

Westinghouse Redesigns Oil Mist Control Unit

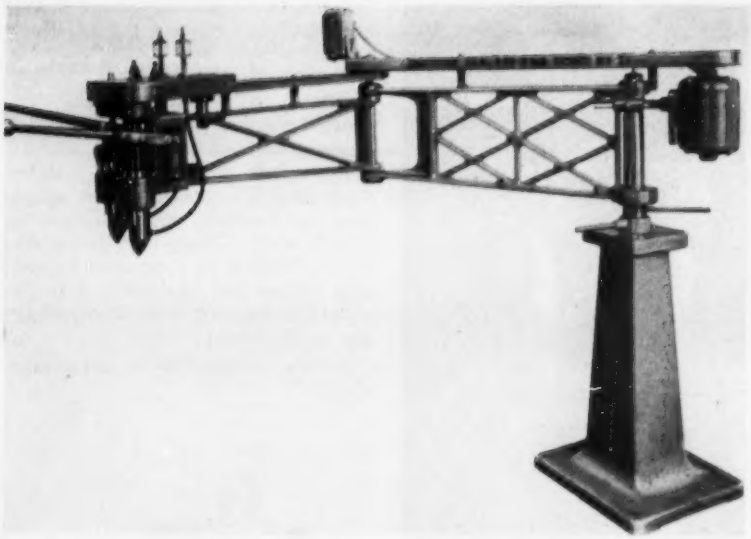
Redesigned Precipitron oil mist control unit is available in two models. PO-6, with an air handling capacity of 600 cfm, and PO-12 with 1200 cfm, recover coolant oil from mist and smoke generated by high-speed cutting, grinding, milling, and similar machining operations.

Self-contained units can be floor-mounted or ceiling-suspended near the machine tool. Fan motors are three-phase, fractional horse-power for 220- or 440-v service. Power pack operates from a single-phase, 115-v line. PO-6 is 55x22x24 in., weighs 265 lb; PO-12 is 63x31x27 in., weighs 390 lb.

Westinghouse Sturtevant Div, 200 Readville St, Hyde Park, Boston, Mass

Flashing bulletin board for safety posters, plant messages, etc, operates on a 40w lamp flashing approximately 15 times a minute. Carries two separate messages, readable from a wide angle. Over-all size is 14½ wide by 8 in. deep, by 12¼ in. high, furnished with 6 ft of rubber cord and plug.

Industrial Products Co, Philadelphia, Pa



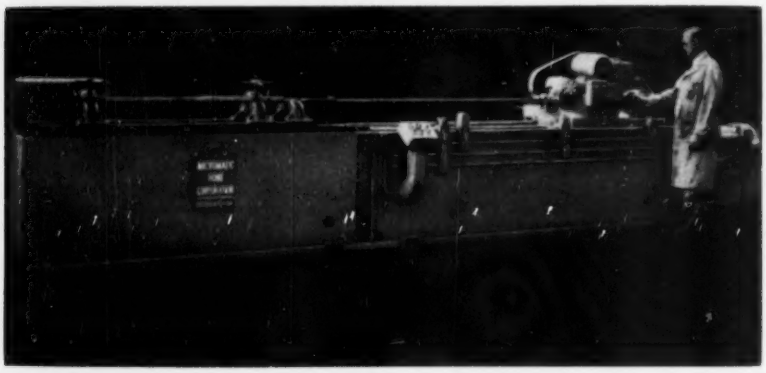
Ekstrom, Carlson Radial-Arm Drill Available in Double-Spindle Model

Ekstrom, Carlson has added three double-spindle models (Type DS) to their line of radial-arm drills designed for the aircraft industry. (*AM*—Nov 12 '51, p189). Each model is produced in two sizes; No. 30 DS has a 30-in. radial reach, No. 71 DS a 71-in. reach. Any model can be supplied with gravity-feed lubricating system at extra cost.

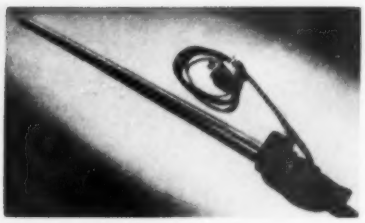
The new models are similar to the earlier single-spindle machines and incorporate 1-hp spindle-drive motors, maximum vertical spindle travel of 4½ in., and drill-chuck capacities of 0 to ⅜ in. Distance between centers of drill spindles is 6 in,; dual spindle speeds are 5000 and 8000 rpm. Pushbutton control and protection for the motor are embodied in the design. Power supply can be specified as 115/230 v, single-phase 60 cycle or 220/440/550 v, 3-phase 60 cycle.

Model A, for bench mounting, has no provision for vertical turret-post adjustment; models B and C incorporate a 6-in. vertical adjustment, B for bench mounting and C with cast-iron base. The smaller-size machine requires a floor space of 56x112 in. to cover all points of the 180° arc; the larger requires 98x196 in. Shipping weights are 610 and 860 lb.

Ekstrom, Carlson and Co, Dept M-1, 1400 Railroad Ave, Rockford, Ill



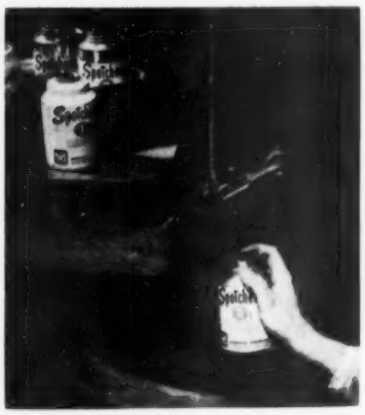
HONING—Model 606 Horizontal Hydrohoner, equipped with automatic feed and sizing controls, Microhones gun barrels up to 4-in. dia with tenths of a thousandth-inch tolerance—*Micromatic Hone Corp, Detroit, Mich*



Greater Bolt Stressing Possible With Westinghouse Bolt Heater

Heater designed for hollow holding bolts used on heavy steam equipment will allow bolts to be turned up tighter. As the bolts cool, flanges draw together to form leak-proof joints. Heater ratings range from 1000 to 6200 watts at 120 v. Bolts from one to three feet long with hole diameters from ½ to 1 in. can be heated with this unit which also heats die blocks and large metal platens. With proper selection, heater life averages 500 hours. Unit includes handle, plugs, cord, and conduit box.

Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa



Inspection Dye Penetrant Can Be Sprayed On

Spotcheck dye penetrant for locating cracks in any solid material can be sprayed from a pressure-can. A cleaner is then sprayed on the surface and wiped off. Finally, an even coat of white developer is brushed on and in a few seconds cracks or pores show up as red lines or spots. No special lights are required. This inspection is best adapted to local areas of large parts or in remote locations where only a few parts are to be tested. Kit includes carrying case.

Magnaflux Corp, 5900 Northwest Highway, Chicago 31, Ill

Take the load off your Radials and Uprights

with the NEW

LELAND-GIFFORD No. 3 MVB

24" SWING — HEAVY DUTY

DRILLING MACHINE

Many a radial or heavy duty upright is now burdened with operations which can be performed with greater speed, economy and efficiency on the new Leland-Gifford No. 3 MVB. Rugged, powerful, versatile, it will handle holes up to 1¼" in steel or 1½" in cast iron. Available with one to four spindles; power, hand or hydraulic feed; two or eight speeds with single or four speed motor and back gearing — it is adaptable to any general purpose or mass production drilling, tapping, reaming and counterboring assignment.

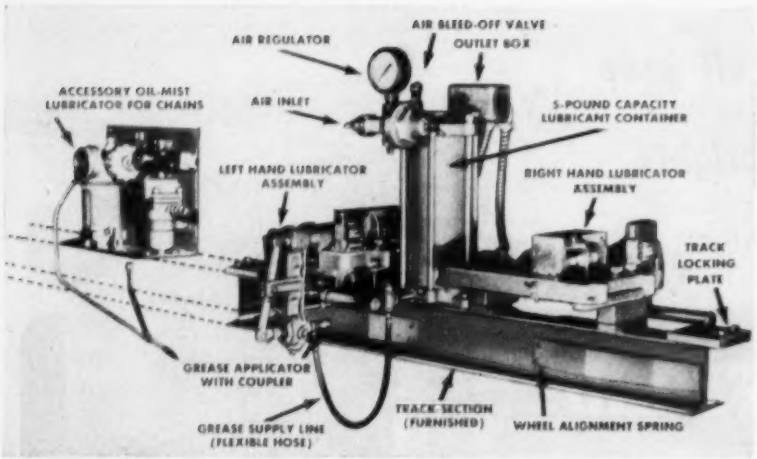
Look into the Leland-Gifford No. 3 MVB. It will not only pay for itself quickly — but give you an extra bonus by taking the load off more costly equipment.

Write for Complete Information

LELAND-GIFFORD

Drilling Machines

WORCESTER 1, MASSACHUSETTS, U.S.A.



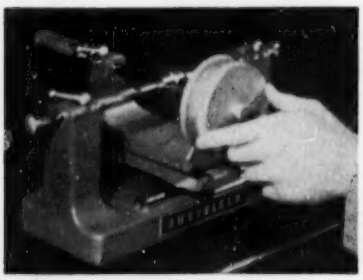
Automatic Lubrication of Conveyor Trolley Wheels

Lubrication of conveyor trolley wheels is automatic with a unit announced by the Alemite division of Stewart-Warner Corp. As long as a hand switch is "On", the unit delivers a pre-set shot of oil or lubricant to passing wheels on each side of the conveyor system. The unit is contained on a section of I-beam (37¾ or 40 in. long) which is fitted into the conveyor track within reach of the house air line and a 115-v supply. It requires 22 in. of headroom over the top of the I-beam. Wheels may be yards apart or as close as 8 in. center-to-center.

As each wheel comes into position, a coupler clamps the lubricant fitting on its hub and delivers the desired shot of oil (as little as 0.005 cu in.), then disengages. Pressure of 800-1000 lb forces lubricant into the bearing. Reservoir holds 5 lb of grease or 2½ qt of oil. When grease is used, house air is regulated to apply pressure to a follower plate to assure delivery of lubricant to the piston plunger.

The unit is complete with lubricant reservoir, right- and left-hand lubricator assemblies with protective covers and anchor plates, and a section of track.

Stewart-Warner Corp, 1826 Diversey Pkwy, Chicago 14, Ill



Sheffield Instrument Machines Diameters Within 0.00001 in.

Instrument for checking diametral thread elements consists of two adjustable centers mounted on a base and a movable carriage with micrometer and reference-point indicator. The indicator incorporates a fixed line and pointer which gives micrometer anvil movement a magnification of 350 to 1. The micrometer has a mat-chrome, graduated drum; a vernier scale enables measurements within 0.00001 in. to be made against a cylindrical standard.

Three models are available, depending on capacity required. Diameter capacities are 0 to 4 in., 0 to 7 in., and 6 to 12 in. Respective distances between centers are 8, 12½, and 14 in.

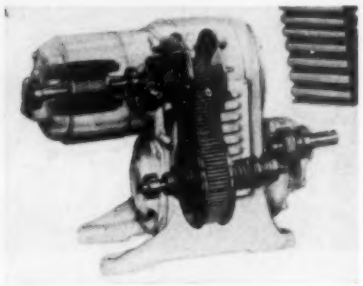
The Sheffield Corp, Dayton 1, Ohio

Apollo Metal-Finishing Process

Stainless steel, aluminum, monel, carbon, steel, and other metal or metal-alloy plates, sheets, and coils can be finished within microinch specifications by Apollo Metal Works. In addition to minute tolerance control of the finish, their process includes a method of cooling and cleaning the metal during polishing. It is said that because the coolant is kept in constant flow and carefully filtered, grain marks and flaws are reduced to a minimum and there is no distortion. All surfaces are finished end-to-end.

Sheet and plate can be finished in sizes to 48x144 in., gage 0.018 to 0.375 in. Coils can be finished in widths from 24 to 36 in., gages 0.025 to 0.050 in., in standard mill lengths. Applications include home and commercial appliances such as sink and range tops, food-processing equipment, and instrument panels.

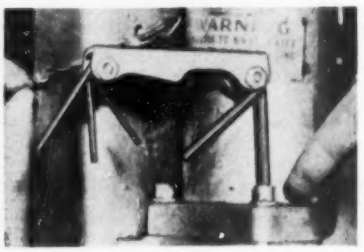
Apollo Metal Works, Dept A-2, 66th Pl & S Oak Park Ave, Chicago 38, Ill



Double-Ribbed V-Belt for Variable-Speed Motors

Double-ribbed V-belt, designed by US Electrical Motors, is said to reduce internal friction and permit greater flexibility without sacrifice of strength. Of synthetic rubber, they are built up in layers, then cured under pressure in molds. The use of synthetic fiber instead of cotton cord reportedly adds 25% more strength and reduces heat by permitting the employment of smaller cords.

US Electrical Motors Inc, Box 2058, Los Angeles 54, Calif

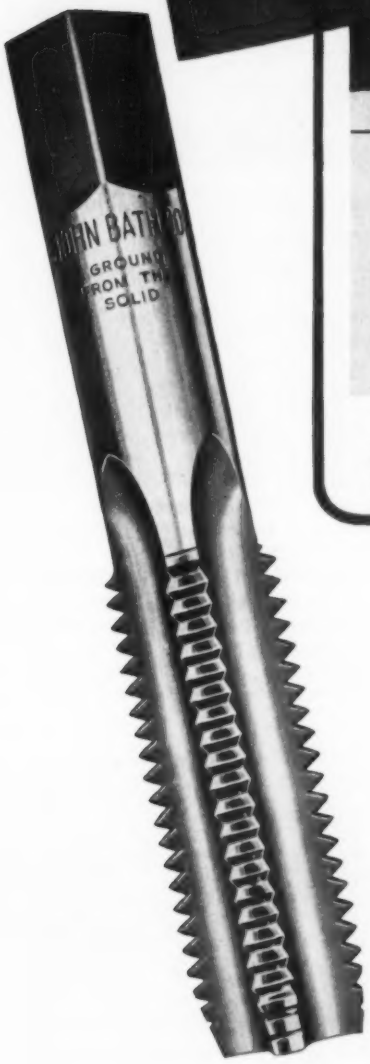


SMITTY ALLEN WRENCH SET is contained in a knife-like folding handle carrying five sizes. Model P-5 is for No. 10 7/16 in. setscrews and No. 5 to 5/16-in. capscrews. P-6 fits No. 3 to 5/16-in. setscrews and No. 1 to No. 12 capscrews. Wrenches can be replaced when too short for grinding—
H D Hunter Tool Co, Whittier, Calif

TAP-ODDITIES

Pete had a happy thought one day
As he picked his favorite brand.
"Let's fix Bath Tap selection
So the job will go as planned!"

Now — each worker draws a slug
To fit the right job number.
And always gets the right Bath Tap
Plus — the very latest rhumba!



INSIST ON BATH TAPS
—PROFIT BY THEIR
PLUS—PERFORMANCE

Jobs that are properly set up, always specify the pre-determined type of Bath Tap to be used for the best threading results.

Many factors affect this selection. There's the type of hole to be threaded, the type of machine to be used, the holding device, the class of fit required, lubrication — but most important, the kind of metal to be worked. Many times, this last factor is not given proper consideration, resulting in poor threads and reduced tap efficiency.

For example, because of abrasive action, ground thread taps with surface treatment are best for cast iron. Bath Taps for threading brass and copper are designed with specific hook and relief for these materials. Steels require proper flute selection and the correct grind such as Bath type "R" taps for tough stainless and high temperature alloys.

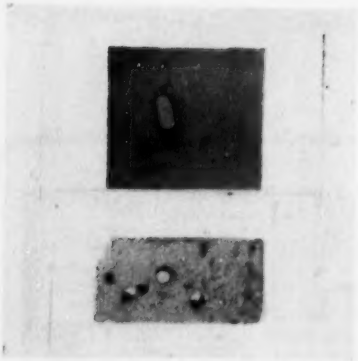
Why not let our engineers help you select the proper type of Bath "ground from the solid" Taps — for that next job? Your inquiry will be given prompt attention.

JOHN BATH CO. INC. · WORCESTER · MASS

PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

JOHN BATH CO. INCORPORATED

22 Grafton St., Worcester, Mass.



New Electrode Cuts Refractories

Completely different from ordinary arcwelding electrodes, the Dyna-Trode self-energizing arc rod requires no ground lead to the work and has the ability to cut through firebrick, Transite, granite, concrete, and other refractory and non-metallic materials. The arc will operate in mid-air and presents a flame-like appearance some 5 to 8 in. long.

The rod consists of two parallel wires of slightly different diameter heavily coated with a special coating formulated to produce a thermo-chemical inter-reaction with the arc stream to react with the non-metallic material. The coating is reduced more slowly than the core and forms a tube through which the energy is concentrated into a fine tip. The thermal ionization of the coating by the arc stream, combined with the concentration, produces the conditions necessary to pierce and melt the refractory material.

A standard 250-amp dc generator and a special electrode holder to carry the two leads are all the equipment required. No air or gas lines are necessary. The arc starts as soon as current is applied, and no metallic material is needed to strike it. Rods presently available will cut holes 1 in. in diameter and 6 in. deep at a rate of 1 to 3 ipm, depending on the material. Rods are consumed in about 55 sec, but longer rods may be made available as customer experience with the equipment shows the need for less-frequent rod changes.

The process is designated DynArc and differs from conventional cutting processes in that the length of arc has no relation to the distance from the material, and the operator, rather than the base material, controls the arc. Although intended primarily for cutting nonconductive materials, the process can be applied to metals, and reinforcing rods in concrete can be cut as readily as the concrete itself. Similarly, barbed wire and wire fencing can be cut without the need for grounding each individual wire.

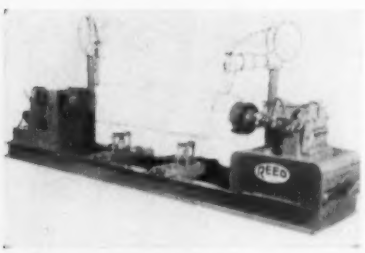
Eutectic Welding Alloys Corp, ChemoTec Div, 40-40 172 St, Flushing, NY

Heat-Treating Furnace Obtains Temperatures to 3100 F

Temperatures to 3100 F can be obtained in a metallurgical heat-treating furnace designed for the use of either hydrogen or dissociated ammonia. A water-jacketed chamber, permitting work to be cooled in a protective atmosphere, is an integral part of the furnace. Four manually operated doors separate the charging, heating, and cooling chambers. The work is handled on trays and manipulated by push-pull rods. Heating elements are formed from molybdenum-alloy rod and supported on Alundum refractories. Protective atmosphere consumption 150-200 cu ft per hr.

Westinghouse Electric Corporation, Box 2099, Pittsburgh 30, Pa

TRACTOR CYLINDER BLOCKS are machined in 22-station Transfer-matic. Performing 188 operations, it mills the distributor boss; drills, bores, and spot-faces the distributor hole; drills, chamfers, and reams tappet holes; drills crankshaft and oil holes; drills and reams oil-filter and dipstick holes; drills, chamfers, and taps the cylinder head, distributor mounting, oil pan, and bearing cap holes; and taps certain oil holes. Operation rate is 72 pieces per hour—*The Cross Co, Detroit 7, Mich*



Assembly Press and Welding Unit for Water-Heater Tanks

An addition to the Reed Engineering line of special fixtures is this combination assembly press and girth seam-welding fixture for light vessels such as water-heater tanks. The unit handles tanks to 7 ft long, 2 ft in dia, and weighing 2 tons. A 5-ton assembly pressure presses the tank heads on the shell-ends and there are two air-operated kickout devices for rapid spotting and vessel removal.

Reed Engineering Co, 1003-17 W Fairview Ave, Carthage, Mo

CAN YOU COMPETE SUCCESSFULLY?

or . . . is out-of-date equipment putting you out of the running?

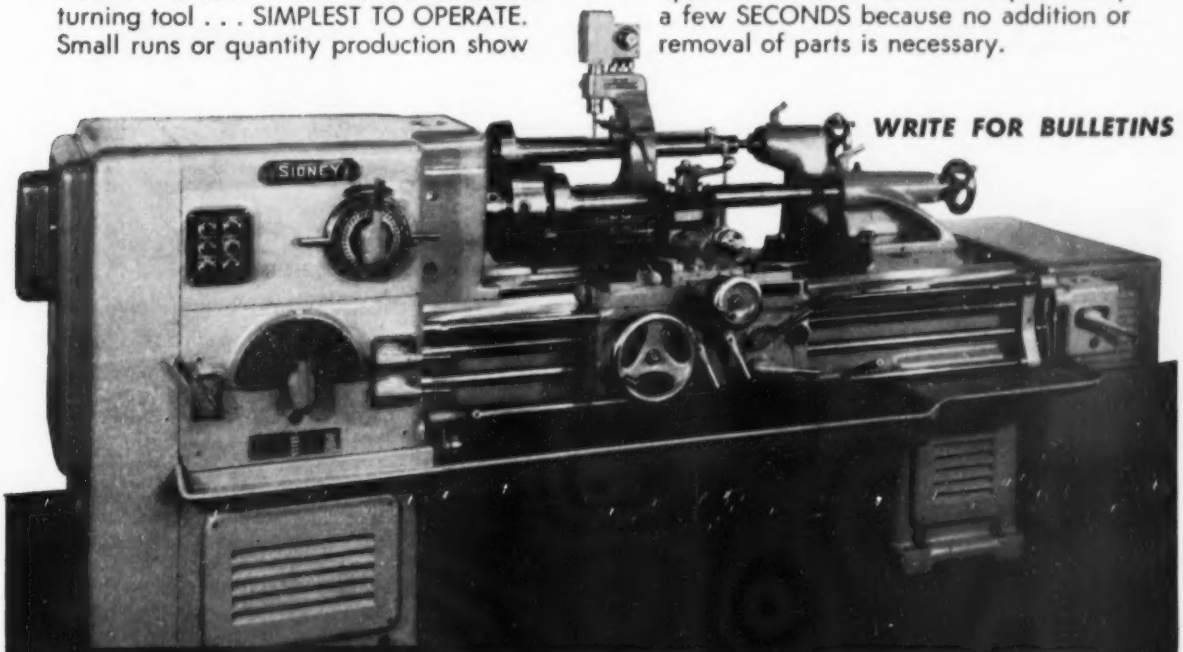
Obsolete equipment is a vicious tax on your costs and production. . . it ruins efficiency . . . make costs spiral sky-high . . . puts the KO on your estimates instead of the OK you are bidding for.

SIDNEY FLUID TRACER LATHES

HELP YOU OVERCOME COMPETITION

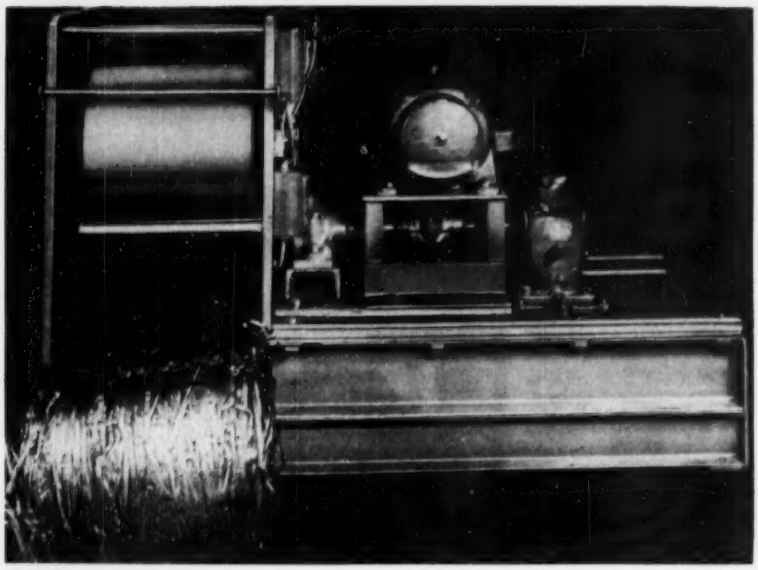
Furnished in connection with any size or model of Sidney Lathe, the FLUID TRACER makes it the most modern turning tool . . . SIMPLEST TO OPERATE. Small runs or quantity production show TREMENDOUS SAVINGS PER FINISHED PIECE. Change-over to standard lathe operation or back to tracer requires only a few SECONDS because no addition or removal of parts is necessary.

WRITE FOR BULLETINS



THE SIDNEY MACHINE TOOL CO. • SIDNEY, OHIO

Builders of Precision Machinery since 1904



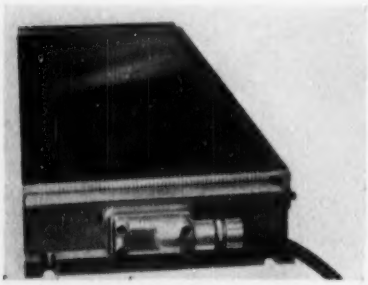
Phillips Scrap Baler Handles Stringy Scrap

Scrap baler forms cylindrical bale 28 in. in diameter and 22 in. in length weighing from 200 to 700 lb. Powered by an electric motor, the machine will handle steel, aluminum, brass, copper, and lead scrap. Developed for a slitting line, it can be used wherever stringy scrap must be handled.

Once the scrap is started into the baling chamber, a rotating mandrel pulls the string in and a heavy roller oscillates up and down to keep the bale compact. When maximum bale diameter is reached, a hydraulic device withdraws the mandrel and the bale rolls down an inclined plane. It is reported that scrap baled in this manner can be sold as No. 1 melting scrap.

Machine dimensions: 72-in. length, 48-in. width, 52-in. height.

Phillips Mine and Mill Co, 2322 Jane St, Pittsburgh 3, Pa



Sundstrand Power-Grip Chuck

Multiple poles for full work surface holding area are included in a magnetic chuck added to the power-grip chuck line. Closely spaced separators of 0.050-in.-wide brass are separated by ⅛-in.-wide mild-steel spacers. All joints are silver brazed to provide a rigid base for precision grinding.

This design and that of the low-voltage winding is said to give uniform holding power over the entire face of the chuck. This makes the chuck suitable for holding large quantities of small, thin parts with small areas of contact with the chuck.

Sundstrand Magnetic Products Co, Div of Sundstrand Machine Tool Co, Rockford, Ill

Plastic Paint for Corrosive Conditions

Neoprene coatings for severe corrosive conditions were developed by Pennsylvania Salt to meet requirements within its own plants. NeoCoat is a true plastic, involving polymerization, with the accelerator included. The primer, NeoPrime, is available in two forms (one for concrete and one for all other surfaces).

Three coats will build up the thickness of 5 mils required for a coating to stand up in service. Measured against the maintenance cost, the cost of this system is claimed to be less than that of conventional painting despite higher initial cost.

Pennsylvania Salt Manufacturing Co, 1000 Widener Bldg, Philadelphia 7, Pa

Precision-Ground Radial Bearings

The Nice Ball Bearing Co "C" Series precision-ground radial bearings are of the solid-race type and are made in inch dimensions to correspond to light-duty inch-standard sizes. Designed for radial, thrust, or combined-load applications and maximum speeds of 5000 rpm, the bearings incorporate chrome-alloy balls and are available in single-, double-, or non-shielded types.

The Nice Ball Bearing Co, Philadelphia, Pa

Denison Multi-Range Flow-Control Has Two-Way Adjustable Orifice

For metering or controlling oil flow, Denison valve provides 100% regulation of flow within a given range and a choice of ranges for low- or high-volume systems. The orifice is adjustable in both length and width. Range is changed by loosening the locking screw and rotating spools.

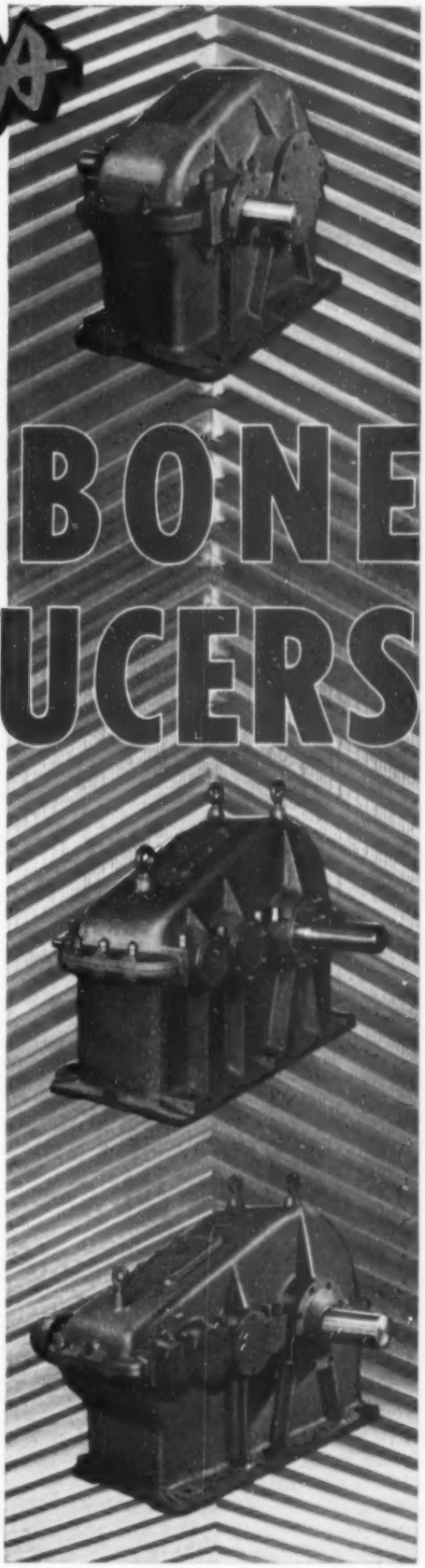
This control can be used in meter-in, bleed-off, or other standard work-cycle circuits. It is designed for operating pressures to 3000 psi and available in 2-port and 3-port types in ¼-, ⅜-, and ¾-in. sizes for subplate mounting.

The Denison Engineering Co, 1160 Dublin Rd, Columbus 16, Ohio

D.O.James

Established 1888

CONTINUOUS-TOOTH HERRINGBONE GEAR REDUCERS



The Gear with the Backbone

Some of the Many Proven *On-the-Job* Advantages of This Type of Gear Reduction Are as Follows

1. No side thrusts.
2. No avoidable deflections, distortions.
3. No necessity for bearings having thrust capacity.
4. Stronger teeth, due to the arch-like construction.
5. Greater load-carrying capacity due to utilization of the full width of face.
6. More silent and smoother action due to absence of distortion.
7. No impact stresses due to avoidance of sideways deflections.
8. Uniform load across face due to balanced thrusts of the opposing helices.
9. Better lubrication due to the oil film formed by "wedge action" of the teeth.
10. Less costly to produce due to the absence of side thrusts and no necessity for heavy sections to reduce deflections — also due to the simultaneous utilization of two cutting tools.
11. Can be substituted for straight tooth gears without any change in design of bearings or housings, or increase in face width, or alteration in pitch.
12. No axial float is necessary because the "V" shaped herringbone teeth wedge automatically into the mating gear thus eliminating all sideways motion and the consequent rubbing action of a screw-like nature existing in single helical gears which result in pitting and wear at relatively low loads.
13. Less expensive gear housings and bearing housings due to balanced thrusts.
14. Large helical angles are used; thus the full benefit of the helical principle is obtained.
15. Tooth deflection, though very small, results in the greatest load being carried by the strongest section.

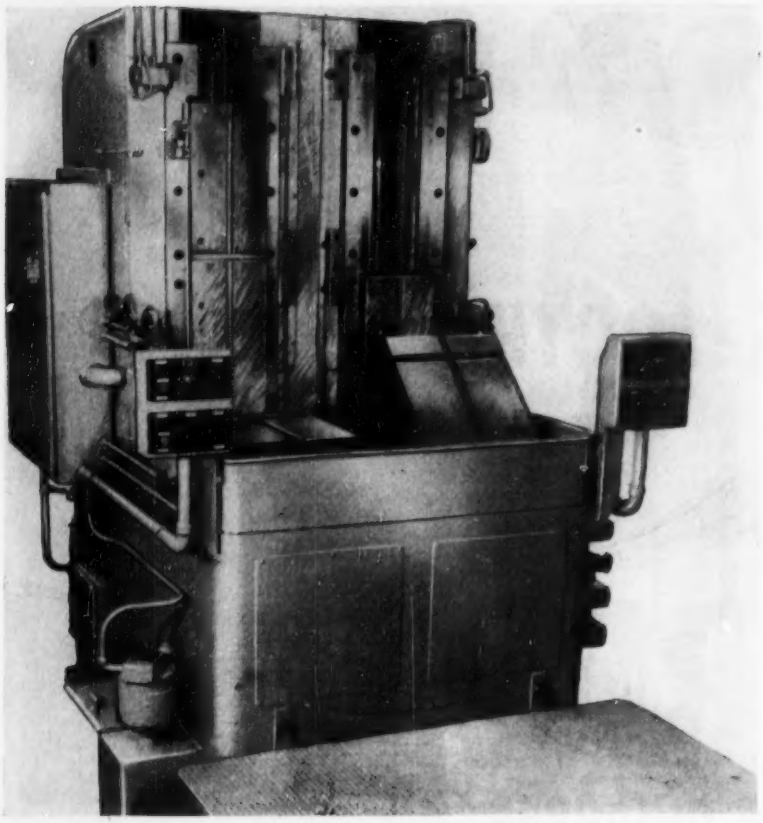
All Gears are Generated Continuous-tooth Herringbone Gears, 20° pressure angle, 30° helix angle

Send for Catalog 40-C

D.O.JAMES GEAR MANUFACTURING CO.

Since 1888 • Makers of Every Type of Gear and Gear Reducers

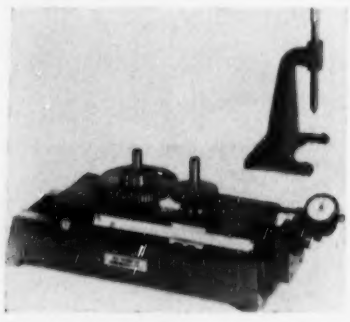
1140 W. MONROE STREET • CHICAGO 7, ILLINOIS



American Machine Broaches Small Parts at High Rate

Dual-ram surface broaching machine, SBD-30-4, has 30-in. stroke and 4-ton capacity for surface broaching small parts at a high production rate. Machine can be set for either automatic or semi-automatic cycle. Design includes tilting worktables and electrical and hydraulic circuits conforming to JIC standards.

American Broach and Machine Co, Ann Arbor, Mich



Spur Gear Tester

George Scherr Co spur gear tester will reveal center-distance errors, eccentricity, spacing errors, and the presence of burrs. Gear backlash can be estimated. The gears to be tested are placed on fixed arbors, avoiding the introduction of errors from rotating shafts. Running quality of the gears can be quickly determined by spinning the gears.

The floating head rests upon precision steel balls and contacts a dial-gage reading to 0.0005 in. The slide is held against the gage by an adjustable spring. A rustproof scale and vernier, reading to 0.001 in., measures center distance. The slides are drilled and tapped for mounting vertical center supports for inspecting pinion gears.

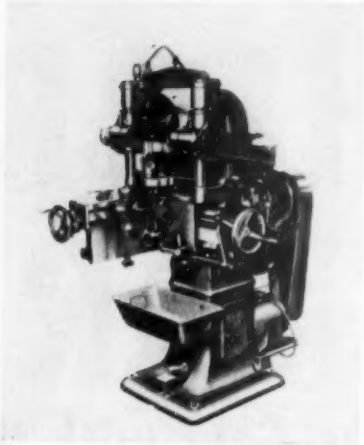
One support is furnished as standard equipment. The instrument base is a flame-hardened Meehanite casting.

George Scherr Co, 200 Lafayette St, NY 12, NY

All-Purpose Welding Electrode

A new general-purpose, mild-steel welding electrode, W-610-A has a dc reverse-polarity rod meeting AWS Class E-6010 specifications. Reportedly, its ability to take high currents, together with freedom from reaction pitting, fingernailing, spattering, and blistering of the coating, assures a high ratio of inches-of-welding to inches-of-electrode used.

General Electric Co, Schenectady, NY



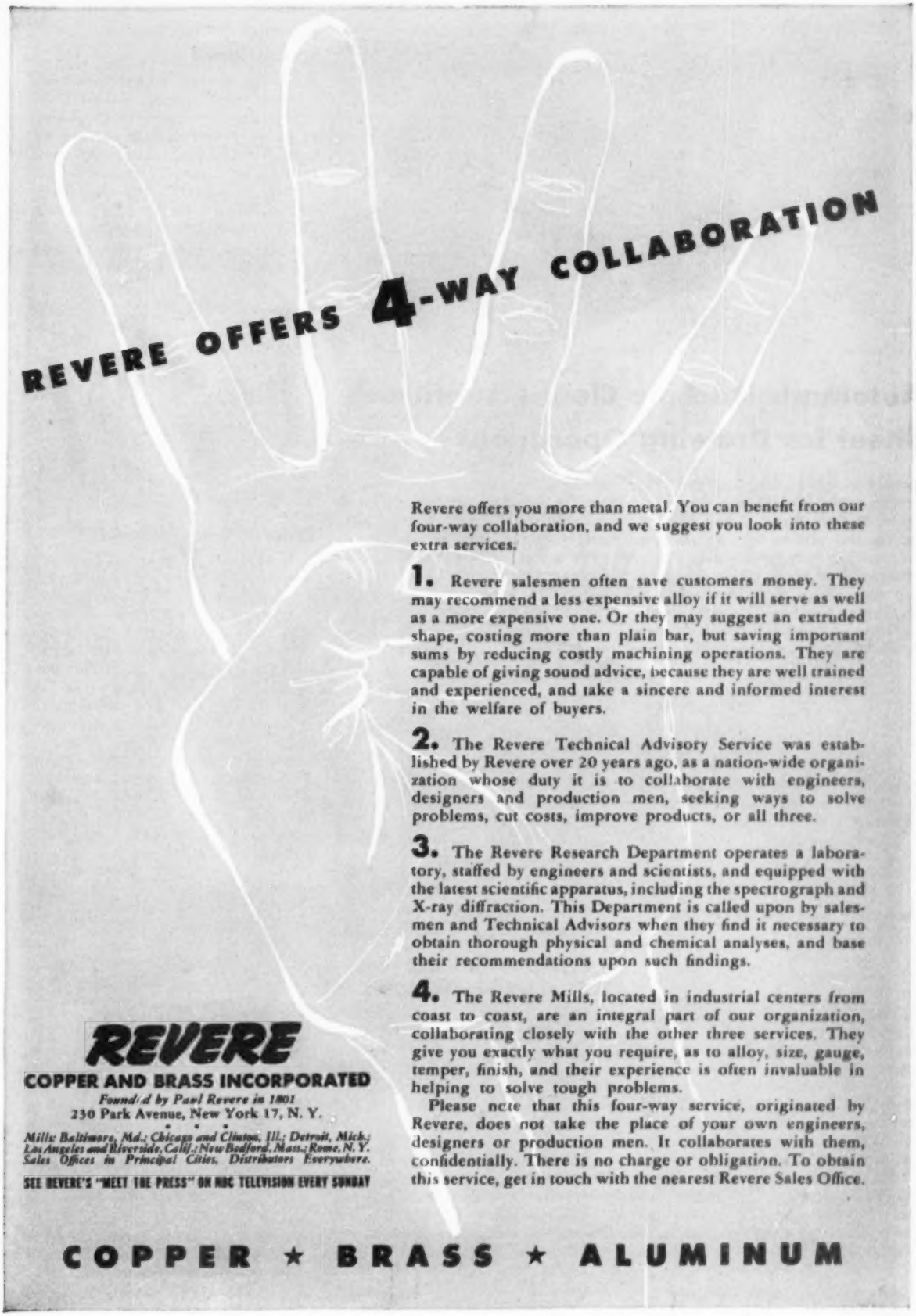
Punch Shaper Machines Blanking Punches in Single Operation

New Essex 32A punch shaper, made by the E H Jones' CVA group (English) machines a blanking punch, hob, or profiled part directly from the solid in a single operation. Accuracy and a fine surface micro-finish are obtained and controlled through microscopic readings.

Stroke of the conventional shaper is set vertically, adjustable from 1½ to 4½ in.; upon completion of the predetermined straight stroke, rocker arm operates in a swivel motion, finishing desired radius. Prescribed shape can be laid out, or a templet soldered or mounted on solid block of tool steel. Microscope attachment is then set directly above the work, permitting strict adherence to the layout lines.

Punch can be made a few thousandths oversized and sheared into the die to a depth of approximately 1/32 in. Residue is finished off by using microscope to exact contour of the sheared-in section to ±0.0005, to assure perfect fit into die.

Imported by: International Machinery Div, British Industries Corp, 16½ Duane St, New York, NY



REVERE OFFERS 4-WAY COLLABORATION

Revere offers you more than metal. You can benefit from our four-way collaboration, and we suggest you look into these extra services.

1. Revere salesmen often save customers money. They may recommend a less expensive alloy if it will serve as well as a more expensive one. Or they may suggest an extruded shape, costing more than plain bar, but saving important sums by reducing costly machining operations. They are capable of giving sound advice, because they are well trained and experienced, and take a sincere and informed interest in the welfare of buyers.

2. The Revere Technical Advisory Service was established by Revere over 20 years ago, as a nation-wide organization whose duty it is to collaborate with engineers, designers and production men, seeking ways to solve problems, cut costs, improve products, or all three.

3. The Revere Research Department operates a laboratory, staffed by engineers and scientists, and equipped with the latest scientific apparatus, including the spectrograph and X-ray diffraction. This Department is called upon by salesmen and Technical Advisors when they find it necessary to obtain thorough physical and chemical analyses, and base their recommendations upon such findings.

4. The Revere Mills, located in industrial centers from coast to coast, are an integral part of our organization, collaborating closely with the other three services. They give you exactly what you require, as to alloy, size, gauge, temper, finish, and their experience is often invaluable in helping to solve tough problems.

Please note that this four-way service, originated by Revere, does not take the place of your own engineers, designers or production men. It collaborates with them, confidentially. There is no charge or obligation. To obtain this service, get in touch with the nearest Revere Sales Office.

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Founded by Paul Revere in 1801

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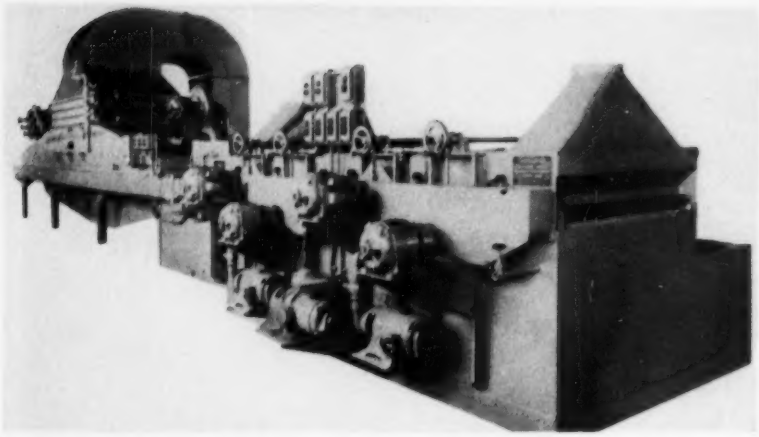
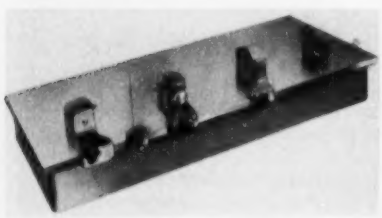


Automatic Machine Cleans, Lubricates Sheet for Drawing Operations

Drawcote applicating machine will process sheet and blanks at speeds up to 55 fpm. Stock is first cleaned on top and bottom with an alkaline cleaner and rotary brushes. After rinsing, clean stock enters the coating unit where it is handled in a horizontal position. The steam-heated, fully enclosed solution tanks can handle blanks up to 48 in. wide. After coating with Drawcote, the stock enters the drying element which is available with steam, gas, or electrically heated ovens.

The dry-coated material is said to be clean and easy to handle. It can be stored for long periods and formed without additional lubricant.

Gilron Products Co, 6007 Euclid Ave, Cleveland 3, Ohio

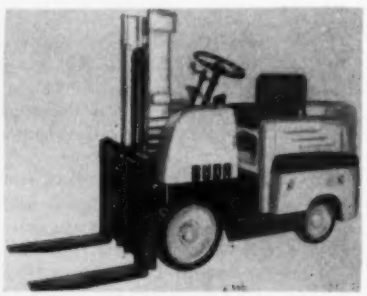


Swanson Inspection Units

Integrated inspection unit includes a surface plate, bench centers, V-blocks, sine plate, and indicator attachment. There is also a concentricity attachment for checking relative diameters and bores in round or square parts of various outside diameters. This is accomplished by a vertically adjustable V-block positioned with a calibrated adjusting screw to compensate for differences in diameter up to 4½ in. in shafts as large as 7¼ in.

The surface plate is available in 12- or 24-in. widths ground to 0.001 in. or scraped to 0.00025 in. The bench centers will accommodate shafts up to 48 in. in length and 8 in. in diameter.

Swanson Tool & Machine Products, Inc, Erie, Pa



Buda 5000-Lb Lift Trucks In Diesel and Gasoline Models

Model FTD50-24 diesel-powered, and Model FT50-24 gasoline-powered lift trucks are rated at 5000-lb capacity at 24-in. load center from heel to forks. They are available in standard heights of lifts of 72, 84, 108, 114, and 120 in.

Side panels, rear, and top can be removed for accessibility to parts. The 12-in.-dia industrial clutch can be changed in approximately 30 min.

Over-all length (less forks) is 88 in. with a wheel base of 50 in. The width of the truck is 42 in. It is designed to turn in 71-in. intersecting aisles.

The Buda Co, Harvey, Ill

Federated Solder Has Greater Spread

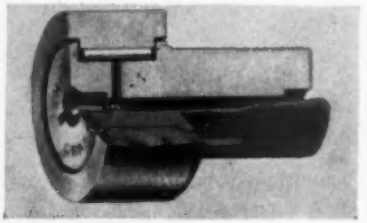
Rosin-core solder, RTS 200, is said to have 30% greater spread than conventional rosin-core solders and to pierce retarding agents, such as oxide films, with great rapidity. Produced from chemicals having no toxicity factor, RTS 200 reportedly left no harmful residue when tested under high-humidity conditions.

Federated Metals Division, American Smelting and Refining Co, NY, NY

Rustproof Diamond Holders

Line of diamond tools has been improved by surfacing the holders with an oxide coating that resists corrosion, avoiding rust from the action of corrosive coolants. Thus the shanks of the tools retain their size and fit in diamond-dressing equipment. Diamonds are set in the holders with a special Colmonoy alloy which has a low coefficient of expansion approximating that of a diamond. This factor, with a low melting temperature, good thermal conductivity, and wear resistance, is said to insure a secure diamond setting.

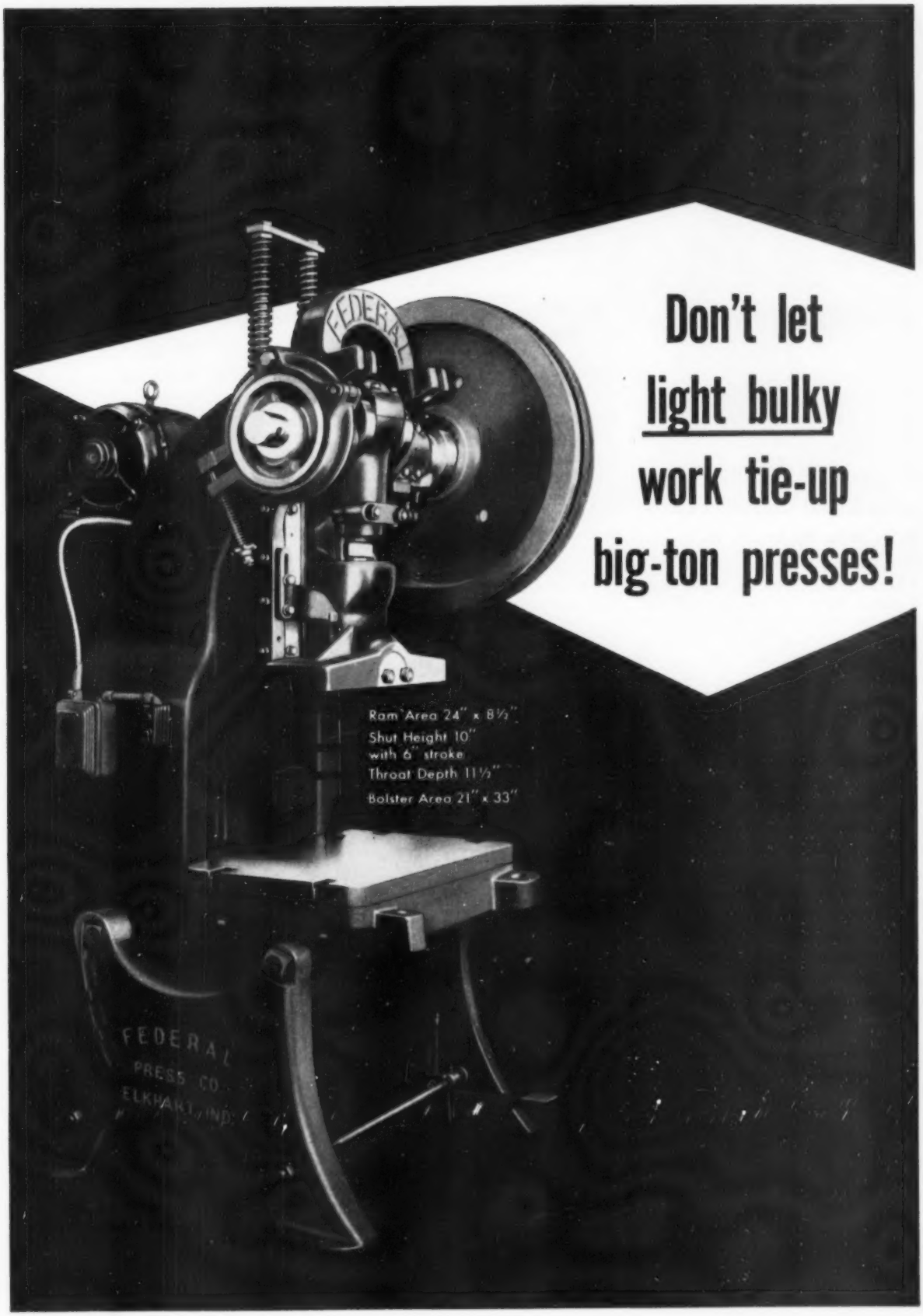
Diamonds and Tools, Inc, 19345 John R St, Detroit 3, Mich

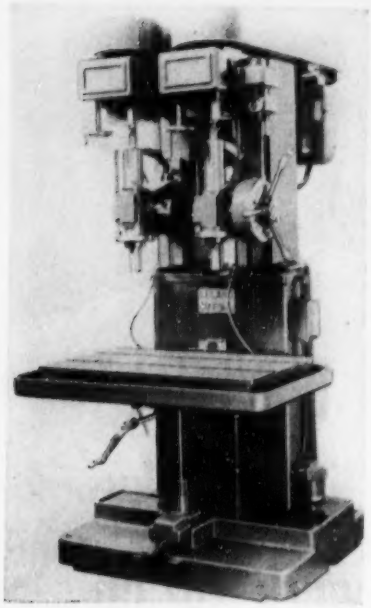


Cam Follower Roller

Type CTA cam follower roller has an integral flange on the stud which makes possible a large stud diameter in relation to the size of the roller. This design is said to be fitted for applications where high speed and heavy load carrying capacity are required. The stud is case-hardened in the bearing section, but left soft on the threaded end.

Smith Bearing Co, Bear Tavern Rd, West Trenton, NJ


FEDERAL
Don't let
light bulky
work tie-up
big-ton presses!
Ram Area 24" x 8½"
Shut Height 10"
with 6" stroke
Throat Depth 11½"
Bolster Area 21" x 33"
FEDERAL
PRESS CO.
ELKHART, IND.



Leland-Gifford Machine Drills Holes Up to 1½ in.

Heavy-duty drilling machine, No. 3 MVB, has a 24-in. swing, No. 3 or 4 Morse taper capacity, one to four spindles, and power, hand, or hydraulic feed. It is capable of drilling holes up to 1½-in. dia in cast iron or 1¼-in. in steel.

Multi-speed machines provide eight standard speeds; changes can be made without stopping the machine. Single-speed and four-speed motors, with or without back gears, can be obtained for other ranges.

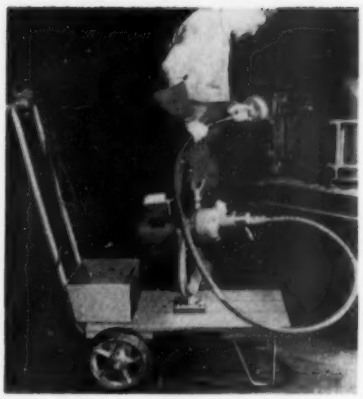
Hydraulic feed has plain or step-by-step controls; power feed has three feed rates, adjustable depth stops, and safety slip clutch. Data on four-spindle machine: weight 9800 lb, floor space 76x61¾ in.

Leland-Gifford Co, Worcester 1, Mass

Key Type Pneumatic Cylinders

A unitized cartridge rod bearing has been developed to aid in servicing and to reduce wear caused by misalignment in key type of pneumatic cylinder. The cartridge unit contains a long bronze rod-end bearing, rod packing, and a self-centering packing at the pivot point, all of which can be replaced without disassembly of the cylinder. Sizes available are 1½ through 8-in. bores with a stroke of any length up to 18 ft.

Carter Controls, Inc, 2800 Bernice Rd, Lansing, Ill

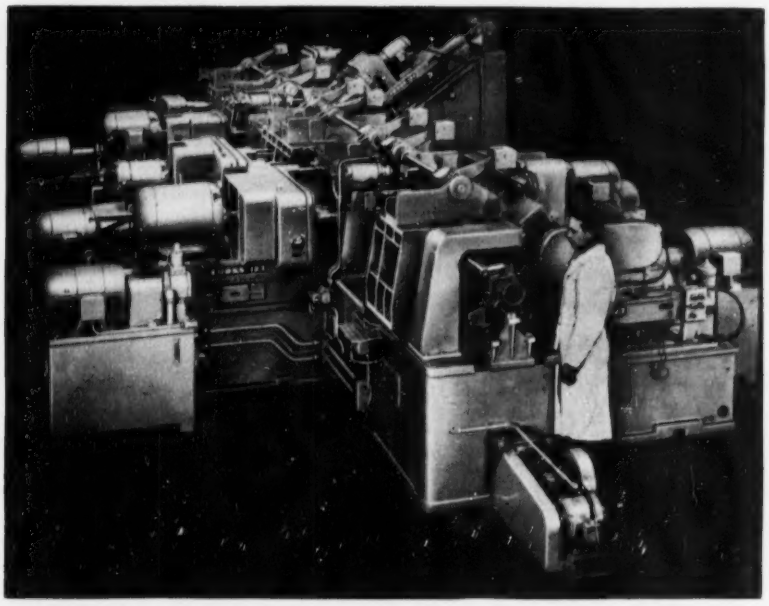


Truck Mounts Strand Flexible-Shaft Machines

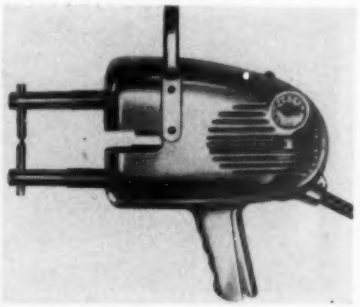
Truck mount for flexible-shaft machines is moved by pressing the handle down to lift the front skids from the floor. It rolls on ball-bearing wheels equipped with rubber tires.

The handpiece and tool of the flexible shaft unit can be clamped on the handle of the mount; the power unit is mounted in a yoke providing a 360° swivel. The deck of the truck carries a metal box for tool and attachment storage.

Franklin Balmar Corp, N A Strand Div, Woodberry, Baltimore 11, Md



TRACTOR CYLINDER BLOCKS are machined in Transfer-matic at the rate of 71 per hour at 100% efficiency. Operations include drilling, counterboring, and tapping the recess for oil filter; drilling, counterboring, and reaming two Welsh plug holes; milling, drilling, reaming, and tapping the hydraulic-pump mounting pad; milling, chamfering, and tapping miscellaneous holes on both sides. The machine has 13 stations with a hydraulic transfer mechanism —*The Cross Company, Detroit 7, Mich*



Ross Portable Spot Welder

Any timing cycle from 1/60th sec to a full second may be established by switch setting in a portable spot welder, with built-in thyrotron-controlled timer switch. Weight of the complete welder is 26 lb.

The welder is said to handle most alloys of aluminum as well as mild, stainless, galvanized, and cadmium-plated steel, and other metals to a combined thickness of 3/16 in. Operates from 220-240 volts, 60-cycle ac. Standard model has 7-in. throat depth and 3-in. opening. Additional throat depths up to 18 in. and special shaped arms and tip are available as well as a mounting stand. Price of basic model: $180.

Ross Machine Tool Co, 7631 S Ashland Ave, Chicago 20, Ill

IT'S RESULTS THAT COUNT!

STANDARD

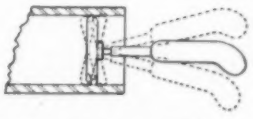
DuBo*

Plug Gages

Produce Superior Results

COLOR FLASH HANDLES
"GO" — GREEN
'NO GO" — Red

THE VALUE of a gage is "what it tells", "how well" and "how easily". If the job at hand calls for fixed limit gages, DuBo Plug Gages will give you the best value in dimensional control. DuBo tells MORE, MORE EASILY.



Operates by Tilting Handle

Whether handle will drop freely or not is the definite yes-or-no indication. No guesswork, no forcing, no fumbling!

MORE DEFINITE CHECK There is no uncertainty with DuBo as with the cylindrical type gage, whether the hole is smaller than the plug, or larger and merely close. DuBo not only checks dimensional accuracy but also reveals taper and out-of-roundness. DuBo reduces the number of parts needlessly rejected or improperly passed.

EASIER OPERATION The DuBo Plug Gage weighs from 70 to 80% less than cylindrical plug gages of the same dimension. It is self-piloting, no trouble at all to enter. A "feather touch" is all that is needed for operation. See diagram at left.

LONGER LIFE Gaging surfaces of the DuBo contact the bore walls only at the instant of making the check. DuBo gives you effective, economical gaging.

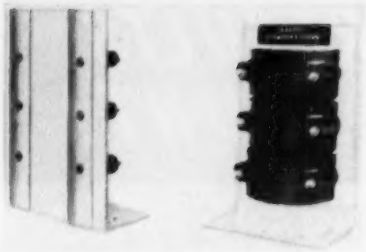
Double end DuBo Plug Gages Under 1.510"

Single end DuBo Plug Gages Over 1.510"

* U.S. and Foreign Patents Granted

Write for Complete Information

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.



Basco Magnetic Separator for Stacked Steel Sheets

Sheet separator contains a permanent magnet to induce a magnetic field in stacked steel sheets and cause the sheets to repel each other and fan out. This self-contained unit is said to be effective for oil- or grease-coated or painted sheets and to separate highly polished sheets without scratching.

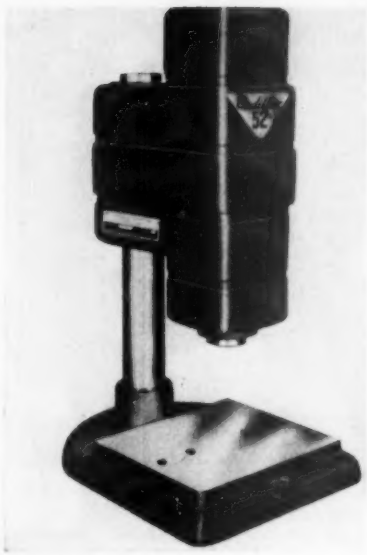
Four standard models handle sheets of 20 gage and lighter to 12 gage and heavier. Other sizes can be made for special requirements.

The Basco Manufacturing Co, 5 Woodside St, Stamford, Conn

Standard Shapes for Jigs, Fixtures

Normalized cast iron tooling standard shapes in 18-in. lengths are available in over 50 sizes. For use individually or as a group in jig and fixture building are these basic shapes: round and rectangular flats; angle, channel, H-, and I-Sections. Except the ends, all shapes are finish ground on outside surfaces and ground flat, parallel, and square to close measurements.

Great Western Steel Co, Inc, 1011 E 61st St, Los Angeles 1, Calif

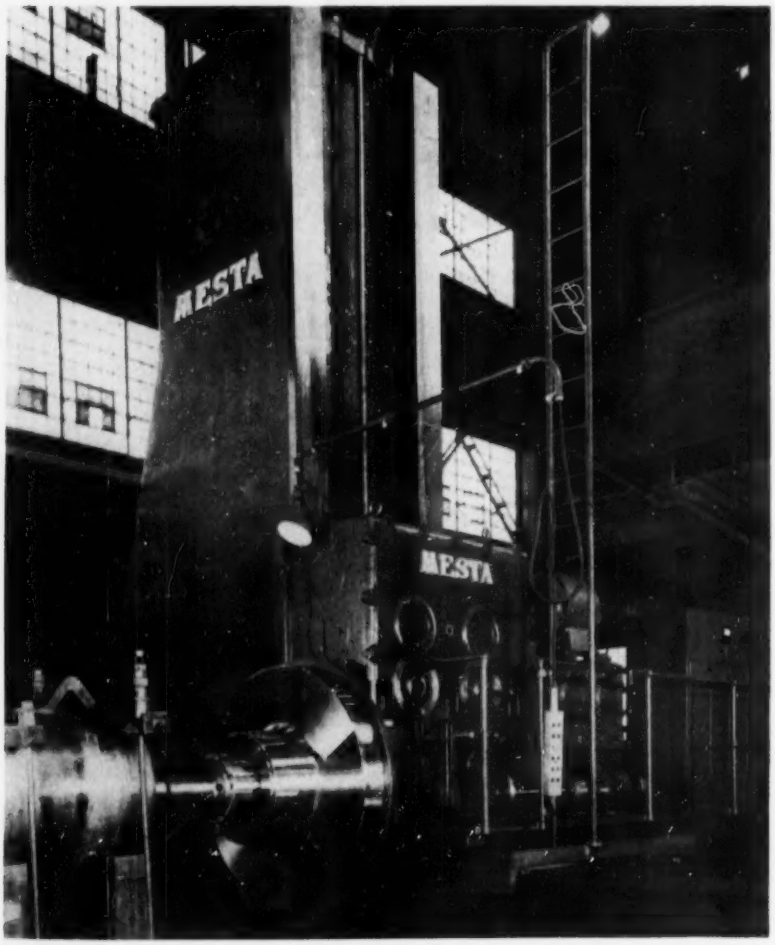


Cadillac Air Impact Press

Model 52 air impact press will operate at speeds up to 10,000 strokes per hour. Pressure up to 8 tons can be obtained from a 100-psi compressed-air line.

The press can be used for high-speed marking, assembling, staking, crimping, riveting, and for producing light stampings.

Cadillac Stamp Co, 17315 Ryan Rd, Detroit 12, Mich



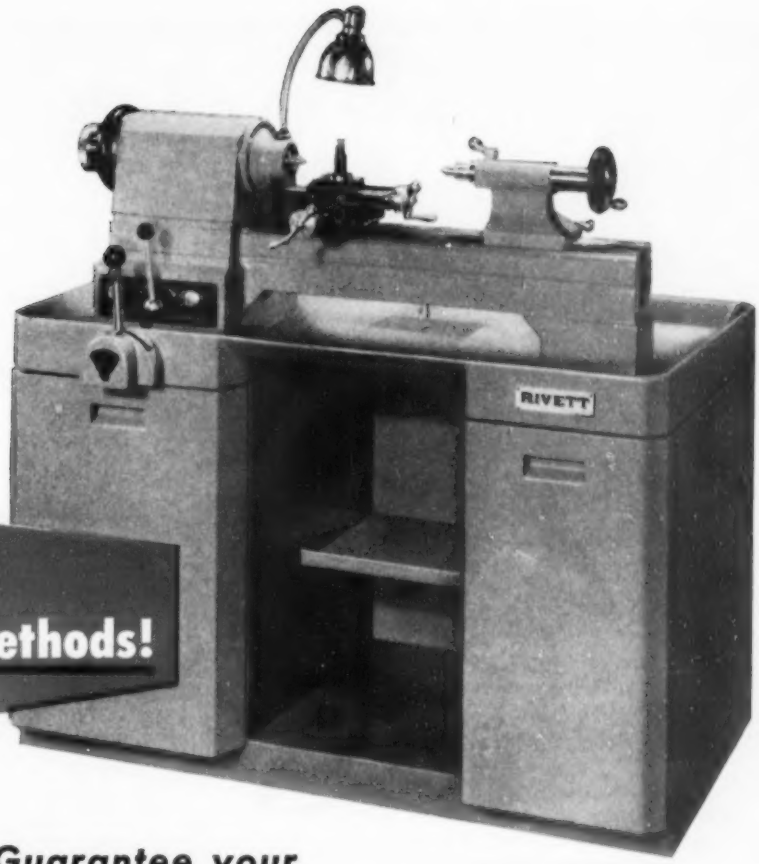
HORIZONTAL BORING and milling machine built to machine parts for 50,000-ton hydraulic press of the heavy press program, can drill and bore holes from 3 in. to more than 10 ft in dia. The 18-in. dia spindle has a variable speed of 0.75 to 56 rpm with a stroke of 8 ft. Weight of the column and saddle on the ways is relieved by springs. Vertical travel of the saddle is 13 ft— *Mesta Machine Co, Pittsburgh, Pa*

Master Impact Wrenches

Model M960 with a nominal capacity for ⅝-in. dia bolts, and Model M970 with a nominal capacity for ¾-in. dia bolts have been added to the line of air-operated impact wrenches produced by Master Pneumatic Tool Co. Because of varied torque requirements, they may be applied on sizes of work other than those indicated by nominal capacity.

Both models operate on air pressures of 80 to 100 psi. They provide four different settings for various torque requirements. With various attachments, they are used for running nuts, screws and bolts, and for tapping.

Master Pneumatic Tool Co, Inc, Krick Rd, Bedford, Ohio



Stop using "CUT and TRY" methods!

Guarantee your finish and size with a

RIVETT 918 Steelway Cabinet Lathe

FEATURES for more precision work

- **Instant selection of 90 to 3750 R.P.M. cutting speeds with convenient control and dial indication.**
- **Self-aligning slide rest automatically squares itself with line of centers.**
- **Double bevel steel ways, precision ground, provide positive centering action.**
- **Collets, with spacing of bearings doubled, have greater precision and gripping power.**
- **Lever chuck closer may be furnished with "one motion" control for collet, spindle drive and brake.**

Snug up to a Rivett 918 and with confidence turn, face or bore to your exacting tolerance—thrill with the knowledge that you are duplicating parts within "tenths".

The speed range and tool rigidity combined with the inherent precision of the 918 assures finish and size—perfect for second operations and toolroom work.

Use a lathe consistent in size with the work to be done—save on the initial expense and continue to save with each piece produced with less effort and without rejection.

Write for bulletin 9185L. Proof of what the 918 will do for you is shown in this 20 page book.

RIVETT LATHE & GRINDER, Inc.

Dept. AMR 4, Brighton 35, Boston, Massachusetts

For More Precision Work *RELY ON RIVETT LATHES AND GRINDERS, The Master Craftsman's Master Tools*

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Grinding Wheels

Good balance, that is! And it's characteristic of Simonds Grinding wheels. It's in their physical balance for true running. It's in their economical balance between wheel cost and grinding results. It's in the versatile application of the line they represent. Your Simonds distributor carries balanced stocks including wheels for roughing, finishing, cutting-off and sharpening; abrasive polishing grain; segments for surfacing large flat areas or small pieces held together. Even if you need specially made wheels, he can help you. Write for his name and free data book.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES CHICAGO, DETROIT, BOSTON

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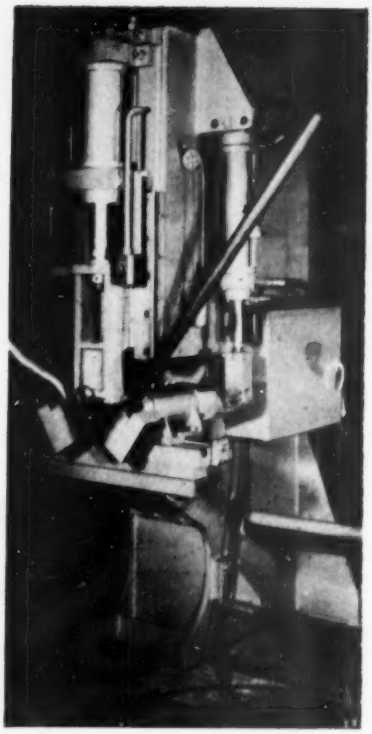
Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.



Pines 20-Ton Tube-Bending Press Bends 2-in. Tube 180°

Vertical ram-type tube- and pipe-bending press handles ½- to 2-in. OD steel tubing with maximum wall-thickness of 0.083 in. and provides clearance to bend a 2-in. tube to 180° with a 5-in.-centerline radius. The ram is operated by a 12-in. stroke, double-acting hydraulic cylinder directly connected to the guide ram slide. Two double-acting cushions are provided with three anchor positions to compensate for various die-holder settings. The wing-type die holders are adjustable from ½ to 15 tons.

A separate hydraulic control valve varies the ram speed from zero to maximum. The ram can be lowered to fit a given sample, then stopped dead while depth-of-bend turret screws are set to duplicate the sample. The ten-station selector turret for depth-of-bend is mounted vertically on the left side of the press frame. After completing any pre-selected number of bends from one to ten, the turret automatically returns to the starting position. The ram speed under no-load and on the return stroke is double the working speed.

The 20-hp, 1200-rpm motor is vertically mounted. Press is supplied with all necessary motors and controls for operation on 220-440 v, 3-

13" TOOLROOM LATHE

SOUTH BEND 13" LATHES

for accurate, low-cost machining

South Bend 13" Lathes are popular where there is a variety of precision parts to be machined. Costs drop as their accuracy and efficiency keep production flowing fast even on the "headache" jobs. Operators prefer them for their simplicity and practically effortless handling. Also, set-ups and change-overs are made so quickly and easily that down-time is held to a minimum.

Now is the time to find out how these quality-built lathes can also bring you better machining at lower costs. Let your near-by South Bend distributor show you how they can ease your production, toolroom and maintenance machining problems. Or, mail coupon for literature on the 13" Toolroom and Quick Change Gear models.

SPECIFICATIONS

Swing—13⅛" over bed and saddle wings, 8" over saddle cross slide.

Distance Between Centers—28¼", 40¼" and 52¼".

Collet Capacity—1" maximum (collets interchangeable with 10"–1", 14½", 16" and 16–24" South Bend lathes).

Spindle Bore—1⅜".

Spindle Speeds—Eight; 40, 60, 90, 135, 270, 418, 628 and 940 r.p.m. approx.

Longitudinal Feeds—48 R.H. or L.H., .0015" to .0841".

Cross Feeds—48, .0006" to .0315".

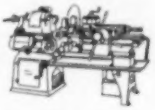
Thread Cutting—48 R.H. or L.H. pitches, 4 to 224 per inch.

SEND INFORMATION CHECKED:

☐ _____

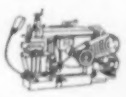
☐ TOOLS & ATTACHMENTS ☐ 9" and 10" BENCH LATHES

☐ 10" to 16-24" FLOOR LATHES



☐ ½" and 1" Collet TURRET LATHES

☐ 14" DRILL PRESSES



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Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana

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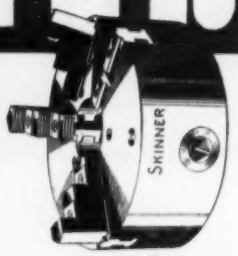
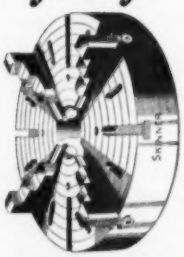
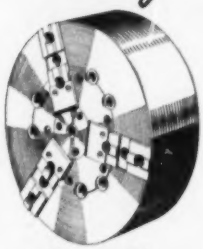


quality

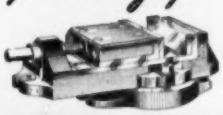


accuracy



long life

positive grip



SCROLL CHUCKS Self-centering models for light, medium and heavy duty jobs in tool room or for production runs. Available in sizes from 3" to 18" with semi-steel or forged steel bodies, and heat-treated alloy steel for all other parts. Provided with two sets of solid jaws or two-piece jaws for holding internal or external work. Lands on the jaw, jaw steps and end bites are ground after the chuck is assembled.

INDEPENDENT CHUCKS Models for medium and heavy duty tool room and general machine shop work. Available in sizes from 4½" to 36" with semi-steel, steel, or forged steel bodies. All other parts are heat-treated alloy steel. Jaws are solid reversible or two-piece with reversible tops for either internal or external gripping. The body surrounds more than 60% of each operating screw for the full length of the screw to assure proper alignment at all times.

AIR & POWER CHUCKS Self-centering models for heavy duty production work on engine and turret lathes and automatics. Sizes from 6" to 24" with forged steel bodies, and with either 2 or 3 jaws are available. The wedge angle is such that work is gripped positively regardless of jaw position. The chuck will not release the work, even if air line is broken, until operator actuates draw bar. Skinner also has a complete line of power chucking accessories.

MACHINE VISES Skinner vises are accurate, fast acting and positive gripping. Series DPV wrench-operated Vises have semi-steel body and hardened and ground work holding surfaces. They have all the universal features so necessary for drill press operations. Clamp the work for drilling in one plane — drill — turn the vise on edge for all right angle drilling operations.

Series FS Vises have swivel base for accurate indexing necessary in milling operations. Top of the movable jaw is ground parallel to the base for use as an indicating base for setting cutters, trueing work, etc.

Details on the full line of products are included in Skinner General Catalog — write to the company or your nearest Skinner distributor for a free copy!

THE SKINNER CHUCK COMPANY
203 Edgewood Ave., New Britain, Conn.

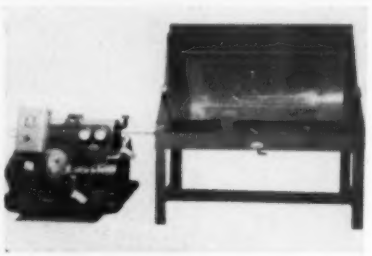
THE CREST OF QUALITY

SKINNER CHUCKS

Chucks - Vises

phase, 60-cycle current. Control circuits operate on 110 v through a step-down transformer. Power is provided by a 2000-psi Vickers pump. Alemite fittings are located on the ram slide ways, the wing-holder spindles, and the crank pins. Hydraulic valves comply with JIC standards.

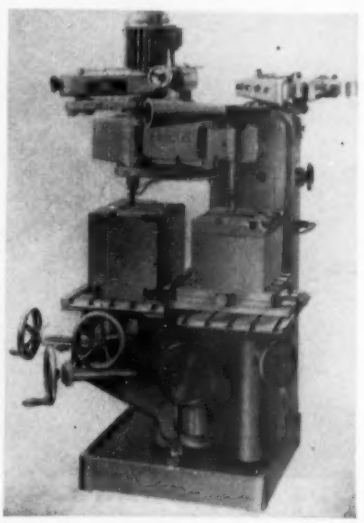
Pines Engineering Co, Inc, 601 Walnut St, Aurora, Ill



Fauver Test Stand Checks Recoil Cylinders

Test stand for checking recoil cylinders for hydraulic pressures from 3000 to 5000 psi has telescopic lid and Plexiglas window. Equipment includes: Fauver hose assemblies, Parker fittings, Parker tubing, Marsh gages, and 30-gal. tank.

J N Fauver Co, Inc, 49 W Hancock, Detroit 1, Mich



Cosa Improves Its Pantograph Large-Die Sinking Machine

Deckel model KF12 universal pantograph die sinking machine has been developed to perform a wide range of copy milling operations from die sinking of large, intricately shaped dies and molds to light engraving. Pantograph system permits two- or three-dimensional milling at 1:1 ra-

U. S. DRILL HEAD COMPANY SAYS . . .

HEAT TREATING ELIMINATED

- *REJECTIONS REDUCED*
- *WEARABILITY INCREASED AND*

COSTS CUT 50%

WITH

STRESSPROOF®

SEVERELY COLD-WORKED, FURNACE-TREATED STEEL BARS

Multiple spindle, made by U.S. Drill Head Company, Cincinnati, Ohio, uses spindles made from STRESSPROOF.

• Spindles for these multiple drill-heads must be straight. Formerly heat-treated, straightening was a difficult, costly job, and rejections were high.

How produced from STRESSPROOF, heat-treating, with its attendant straightening problem, is eliminated; machinability is increased 25%; wearing properties have been improved; and costs reduced 50%.

STRESSPROOF makes a better part at a lower cost.

STRESSPROOF's value to manufacturers like U.S. Drill Head stems from its unique combination of four qualities in the bar: (1) Strength, (2) Wearability, (3) Machinability, and (4) Minimum Warpage. Yet STRESSPROOF costs less than other quality cold-finished steel bars. It comes in cold-drawn or ground and polished finish.

SEND FOR . . .
Free Engineering Bulletin "New Economies in the Use of Steel Bars"

La Salle **STEEL CO.**

Manufacturers of the Most Complete Line of Carbon and Alloy Cold-Finished and Ground and Polished Steel Bars in America.

La Salle Steel Co.
1416 150th Street
Hammond, Indiana

Please send me your STRESSPROOF Bulletin.

Name _____
Title _____
Company _____
Address _____
City _____ Zone _____ State _____

PRECISION MACHINE GROUND-FROM-THE-SOLID

Consistent Exellent Performance — Unusual Economy and Ultra Precision work has firmly established Jarvis Solid Tungsten Carbide Tools among users who know quality.

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THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

tio, and reductions or enlargements from 1:1.5 to 1:4.

Cutting area and working capacity has been increased on the new model. In a single setup, cutting tool will cover an area of 15¾x15¾ in., or 10x19¾ in. Areas can be utilized to fullest extent even with die blocks up to 15¾ in. high.

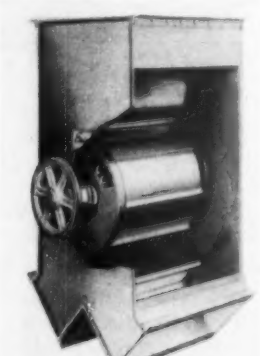
Power-operated vertical saddle permits both master and workpiece to be raised or lowered simultaneously at a rate of 30 in. per minute. Even the heaviest workpiece is positioned vertically to within a small fraction of an inch.

Rough-milling spindle has built-in speed reducer and will hold collets for chucking tools with No. 2 Morse taper, or straight shanks up to ¾-in. dia. The 1.5-hp spindle motor assures positive non-slip operation, even under low speeds and heavy cuts. Infinitely variable spindle speeds range from 60 to 10,000 rpm.

Circular forming attachment, easily mounted on the tool slide, allows circular forming operations in both vertical and horizontal planes, and on inclined surfaces.

Unit weighs approximately 3200 lb, is 54 in. long, 67 in. wide, and 77 in. high.

Cosa Corp, 405 Lexington Ave, New York, NY



Magnetic Drum Separates Ferrous Particles from Material

Two new models of Eriez permanent magnetic drums are available for removing tramp iron and medium fine ferrous contamination automatically from materials conveyed in systems not employing belts.

The drum, available with or without housing, consists of a revolving cylindrical shell containing a stationary, high-powered Alnico V permanent magnet. Material is fed into the drum hopper where flow is regulated by a feeding device. As it reaches the drum, the magnetic field

POWERFUL
FLEXIBLE SHAFT MACHINES

AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS

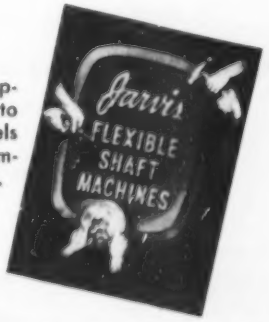
by **Jarvis**

Do Your Jobs

EASIER -- FASTER -- MORE ECONOMICALLY!

Whether your operations call for GRINDING, CUTTING, BUFFING, SANDING or ROTARY FILING, Jarvis Flexible Shaft Machines are available in BENCH, FLOOR or OVERHEAD Types — in Single or Multiple Speeds to suit your Individual Requirements.

A Jarvis Factory Trained Representative will be pleased to assist you in selecting models best suited to your use. Complete catalog upon request.



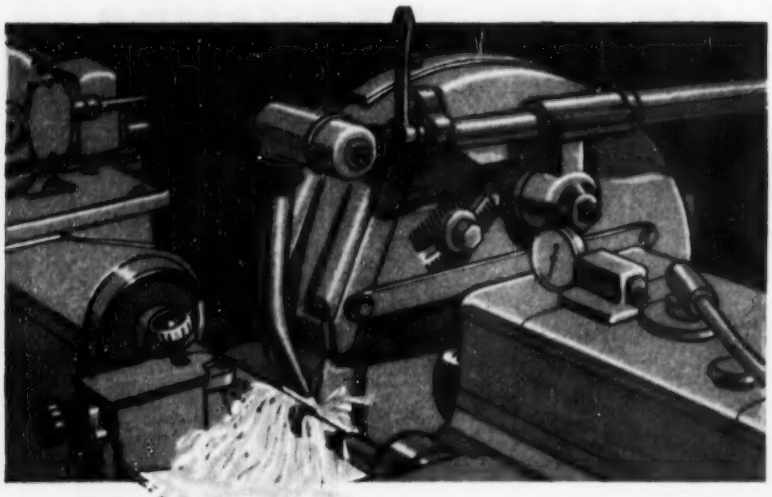
TAPPING ATTACHMENTS · TAPS · FLEXIBLE SHAFTS AND MACHINES · ROTARY FILES · TUNGSTEN CARBIDE REAMERS AND MILLS · DRILLS · BORING BITS

Jarvis POWER TOOLS

THE CHARLES L. JARVIS CO.
MIDDLETOWN IN CONNECTICUT

Forecast:

CLEAR and COOL



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are ahead when you use . . .

ECONOMY LIQUID 1500

. . . the *Transparent* COOLANT for grinding

The grinding action of ECONOMY LIQUID 1500 is superior because —

- wheels are open and free cutting
- chips settle fast
- the operator can see the work

When ECONOMY LIQUID 1500 is used —

- the coolant stays "sweet"
- rust protection is excellent
- parts are easy to handle — not slippery

ALL OF THESE ADVANTAGES AT A COOLANT COST OF ABOUT 1¢ A GALLON

You can prove the benefits of using Economy Liquid 1500 by testing it in YOUR plant. We'll be glad to send you a working sample on request.

ECONOMY METALWORKING LUBRICANTS — THE WBCo

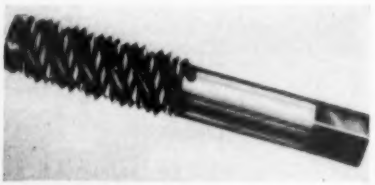
For detailed information on ECONOMY METALWORKING LUBRICANTS — *write for a copy of our latest catalog.*

THE WHITE & BAGLEY COMPANY
WORCESTER, MASS. • DETROIT, MICH.
Originators of Grinding Lubricants

attracts and holds ferrous particles to the revolving shell. Non-magnetic material falls free, and ferrous particles are held until carried out of the field.

Models DF-101 and DF-102 have changeable sheave sizes for various operating speeds; both are available complete with motor.

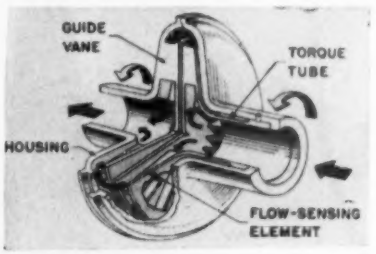
Eriez Manufacturing Co, Erie, Pa



Shearcut Thread Broach Taps Heat-Treated Alloys

High-speed steel thread broach taps highly heat-treated steel parts of various alloys including chrome-moly alloys and stainless steel of 40 or 50 R_c. Tools are made in standard sizes from No. 4 to No. 12 machine screw and from ¼ to 1½ in. (NC and NF). It is reported to be practically unbreakable because of the low torque required to cut the thread.

Shearcut Tool Co, 7045 Darby Ave, Reseda, Calif



Control Flowmeter Is Mass-Sensitive Only

Instrument is capable of measuring the true mass-rate-of-flow of anything that will move through a pipe. It is totally insensitive to volume. Direct reading measurements of pounds per minute can be made on gases, liquids, slurries, or particles in an air stream.

Applications include: mixture control, loading measurement, weight-mixing chemical control, and experimental installations to eliminate the need for costly weighing tanks in the testing of aircraft engines.

Operation is based on measurement of the torque necessary to give the flowing mass a Coriolis acceleration. This torque is dependent only

OK CENTERLESS BLADES

. . . standard equipment on practically every centerless grinder built

because they L-A-S-T L-O-N-G-E-R

The phenomenal long life of Ohio Centerless Work Blades and Guides is due to their extreme hardness, high finish and close tolerances. Long blade life means high production resulting in lower costs.

Made of tungsten carbide, high speed steel, cast alloys or iron. Non-metallic tips available upon request.

In addition to standard blades, special contours, angles or shapes are made to your blue prints.

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Hardened Spacers, Ways, Gibs, Ball Races, Slitter Knives, Shear Blades, Rotary Shear Knives, Bronze Ways, Wear Strips.

OHIO KNIFE CO. DEPT. W
CINCINNATI 23, OHIO
Please send free Bulletins on OK Centerless Blades, etc.

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COMPANY_____
ADDRESS_____ STATE_____
CITY_____

GO WITH OHIO GREEN

THE OHIO KNIFE CO.

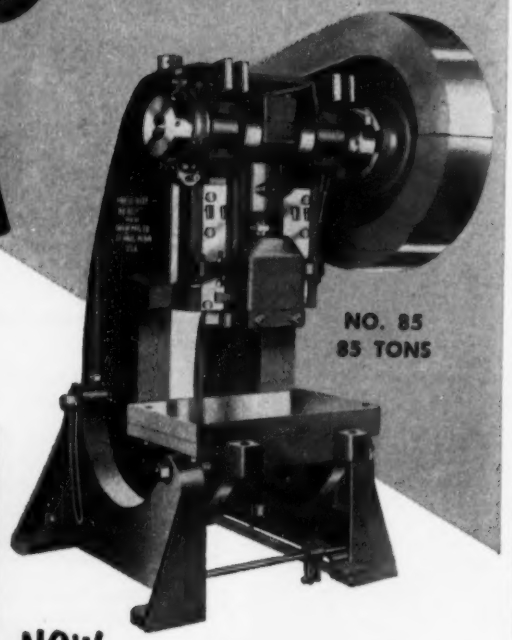
CINCINNATI 23, OHIO

How does YOUR PRESS check out?

STANDARD PRESS FEATURES (at no extra cost)	PRESS-RITE	YOUR PRESS
Uni-Cast Frame	✓	
Anti-Friction Roller Bearings in Flywheel	✓	
Four Point Engagement Sliding Clutch Key	✓	
Automatic Cam Operated Brake	✓	
Cam Operated Single Stroke Safety Mechanism	✓	
Built-In Tie Rods	✓	
Triple Ramway Lubrication	✓	
Bronze Bushed Main Bearings	✓	
Replaceable Die Shank Bushing	✓	
Airflex Friction Clutch (optional at extra cost)	✓	

PRESS-RITE
OPEN BACK—INCLINABLE
POWER PRESSES

NO. 60—60 TONS
AIR CLUTCH EQUIPPED



NO. 85
85 TONS

Get all the facts

About Press-Rite Press features, together with specifications. A complete line of 8 models from 5 to 85 tons capacity.

NOW You Get All These Features in *One* Press . . . the Press-Rite Press. Buy Press-Rite Presses today and get increased production . . . longer die life . . . greater operator confidence . . . longer press life . . . and scores of other benefits. Press-Rite Presses help to cut your operating expense and eliminate costly down time. Find out more about Press-Rite Presses today.

Send for Bulletin P552.

Sales Service Machine Tool Co. SSMT

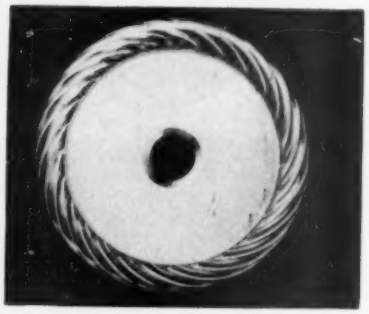
PRESS RITE PRESSES • SHAPE RITE SHAPERS • KELLER POWER HACK SAWS

2347 UNIVERSITY AVENUE • ST. PAUL 4, MINNESOTA

on the dimensions of the flowmeter, a rotational speed, and the mass flow.

The most vital industrial and military needs will be met first.

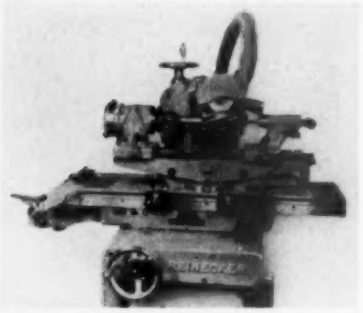
Control Engineering Corp, Norwood 80, Mass



High-Helix Milling Cutter

High-helix, shear type of milling cutter is designed to mill compound contoured surfaces. With a cutting surface of more than 90°, teeth are always in contact with the work and are said to clean themselves and impart a smooth finish. The cutters are suitable for milling turbine compressor blades, stator vanes, buckets, and generating cams. A special adapter makes possible their use on any milling machine.

Douglas Tool Co, 2300 E Nine Mile Rd, Hazel Park, Mich



Reinecker Unit Grinds Straight And Tapered Helical Cutting Tools

Developed in West Germany by Reinecker Gmb H, Model WZS grinder is now being distributed here. The worktable can be tilted 10° horizontally or vertically, allowing the face grinding of taper tools between exactly aligned centers. A spiral grinding fixture permits the accurate grinding of helical cutting edges, even with steep pitches, on straight and tapered tools.

Employing two crossing guides and a system of rollers, helical pitch is generated by longitudinal move-

THIS GAGE WAS ASSEMBLED IN 3 MINUTES

Blocks are held rigid with eccentric clamps. No direct pressure, no cumbersome holders. The eccentric clamps oppose each other, exerting pull in opposite directions, thus maintaining a .000005 accuracy over entire build up, irrespective of size.

Versatile as a snap gage, ring gage, height gage and scriber. Infinite in its range.

Write for literature on Webber H.D. Gage Blocks and Fixtures.

Webber

HEAVY DUTY GAGE BLOCKS and FIXTURES

WEBBER GAGE COMPANY
12901 Triskett Road, Cleveland 11, Ohio

Largest exclusive manufacturer of gage blocks.

ELECTRO *xtra* DYNAMIC *ependable*

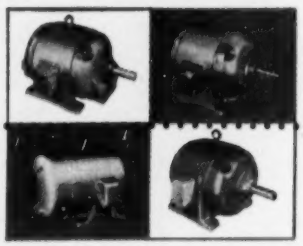
INDUSTRIAL MOTORS

Every Electro Dynamic motor is built with
EXTRA INSULATION in stator slots and between phases
EXTRA IMPREGNATIONS and bakings of the wound stator
EXTRA HIGH-FREQUENCY TESTING of insulation between turns

WRITE TODAY FOR CATALOGUE NO. 469

From 1 to 250 Horsepower (N. E. M. A. STANDARDS)

One-piece cast iron frames.



Extra large "free-flo" air channels.

Permanently aligned cast iron brackets.

Liberal size grease lubricated bearings.

Also a complete line of Direct Current motors and generators

ELECTRO DYNAMIC
DIVISION OF GENERAL DYNAMICS CORPORATION
BAYONNE, NEW JERSEY

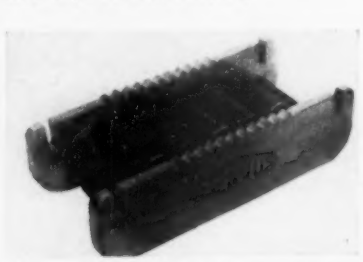
ment of the table by hand without the use of a cutting-tooth support. Generation of the correct helical motion does not depend on the operator's skill.

Grinding head can be tilted 10° up or down; work spindle has a No. 4 Morse taper; lower table swivels through 45° in each direction. Tool faces can be ground up to 50° helical pitch.

MZS is adaptable to the production or sharpening of hobs, drills, counterbores, reamers, milling cutters, and other tools. Spiral and tapered hobs can be sharpened with standard attachments.

These units are designed for standard American voltages and frequencies; calibrations and lead screws are in inches.

Imported by Kurt Orban Co, 205 E 42nd St, New York 17, NY

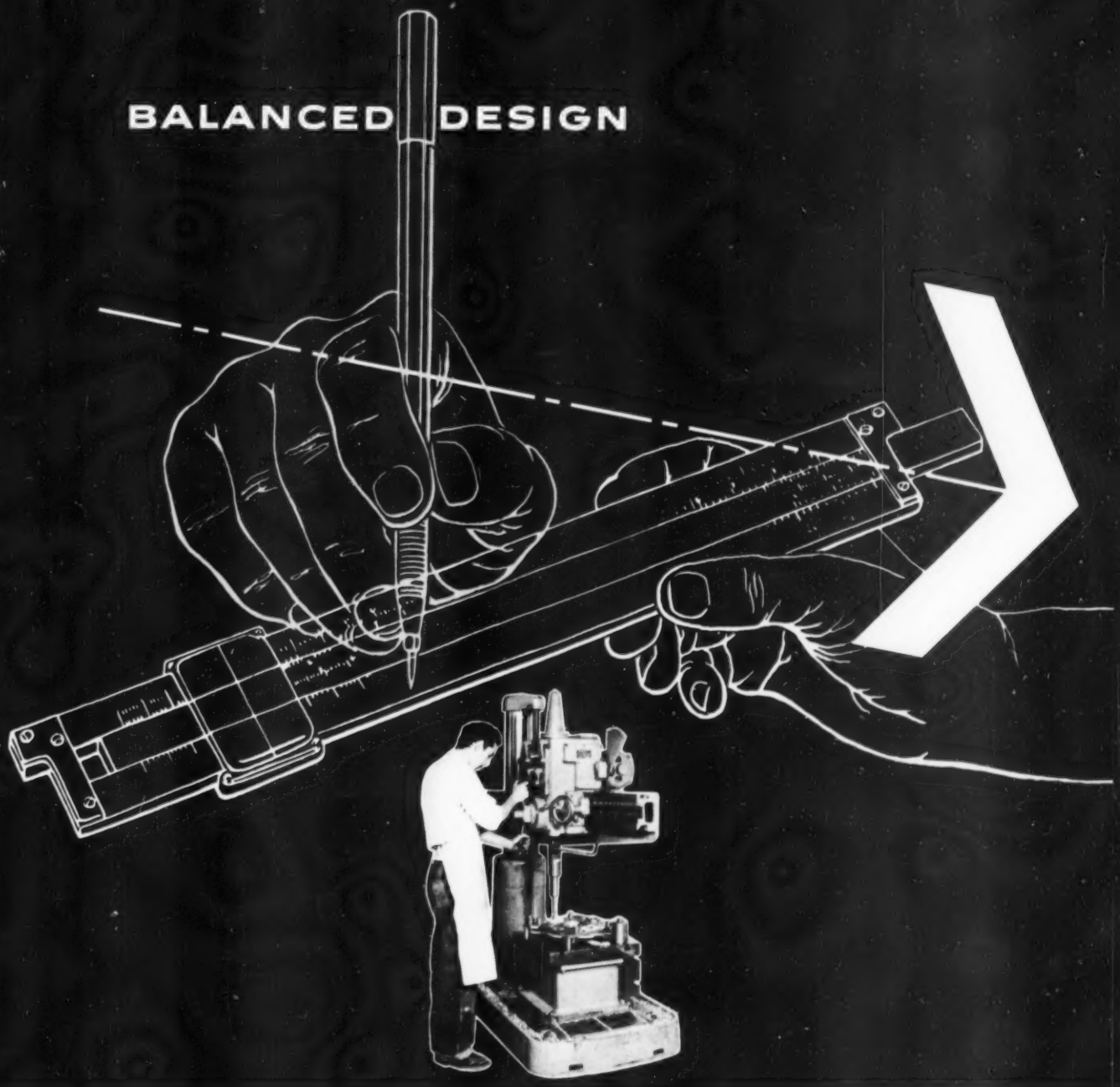


SERVUS ROLLER SKID for moving machinery supports up to 80 tons. Available in 3½-, 4-, and 5-in. widths *—Stokvis-Edera and Co, Inc, 95 Madison Ave, NY 16, NY*

Portable Coolant Unit Pumps 12 gpm Against 4-ft Head

Shellback model 8-5 coolant pump was designed for machines without built-in coolant pumps and not requiring the capacity of model 10-10.

BALANCED DESIGN



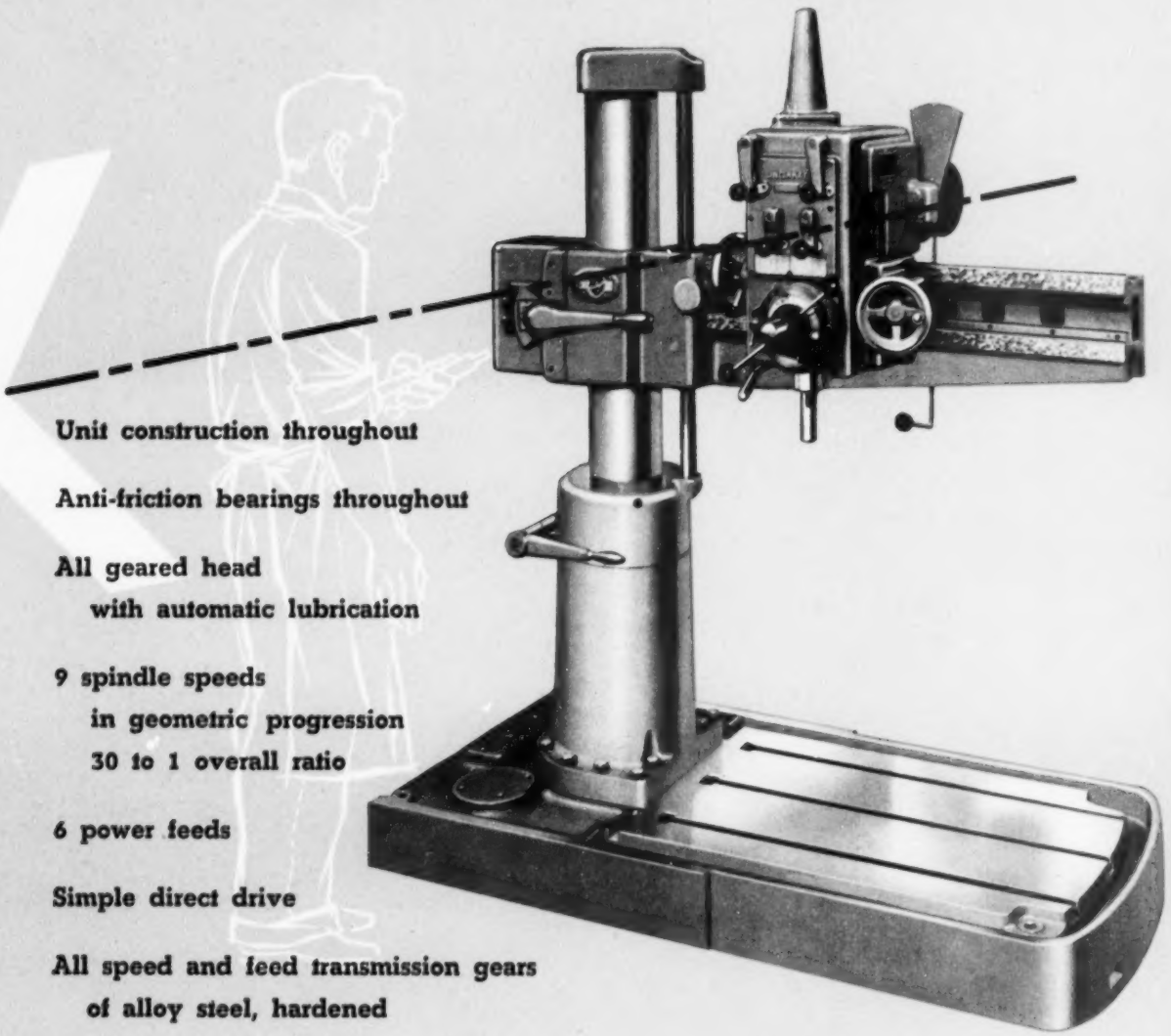
We're getting reports from all over the country on how operators really like the new 3' Arm 7" Column Radial Cintidrill. The smooth way it "handles" . . . the wide range of jobs within its 1-inch capacity . . . its round-the-clock reliability – can all be summed up as BALANCED DESIGN. It'll be worth a check right soon on how this new economy-priced radial can smooth out drilling schedules and save money for you.

best buys in their class!

CINTIDRILL

CINCINNATI LATHE & TOOL CO., CINCINNATI 9, OHIO, U. S. A.

MORE **QUALITY** FEATURES



Unit construction throughout

Anti-friction bearings throughout

All geared head
with automatic lubrication

9 spindle speeds
in geometric progression
30 to 1 overall ratio

6 power feeds

Simple direct drive

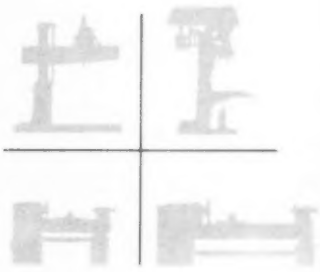
All speed and feed transmission gears
of alloy steel, hardened

This cost-saving radial is just one of the complete balanced line of Cintidrills, including 21″ sliding head box and round column floor drills; 14″ 3000 and 16″ 3000 sliding head bench and floor drills; 16″ and 18″ Royal Cintidrills, bench and floor models, single and multiple spindles. Write for catalogs and name of your nearest dealer.

best buys in their class!

CINTIDRILL

CINCINNATI LATHE & TOOL CO., CINCINNATI 9, OHIO, U. S. A.



PRINTED IN U. S.

This centrifugal-design pump has a 1/15-hp motor and pumps 12 gpm against a 4-ft head or 5 gpm against an 8-ft head. Thrust is neutralized by drawing in coolant from top and bottom. Pump is self-relieving under excessive pressure.

The unit has a 21-in. height and 1-in. diameter. Tank has a 5-gal. capacity. Power is 110-v ac. Weight: 40 lb. Price: $62.50.

Shellback Manufacturing Co, 11833 Hamilton, Detroit 3, Mich

Short-Set Counterbore Has ¼-in. Shank

Union Twist Drill Co has added four styles of high-speed counterbores and spotfacers to its Butterfield line. In addition to standard styles—long and short, set in, straight, and taper shank—two types are manufactured for the aircraft industry. These are long- and short-set styles with a ¼-in. shank. All counterbores are made with the cutter and shank integral and with interchangeable pilots. Pilots are made from hardened and ground carbon tool steel with straight shanks and a flat for the setscrew.

Butterfield Division, Union Twist Drill Co, Derby Line, Vt

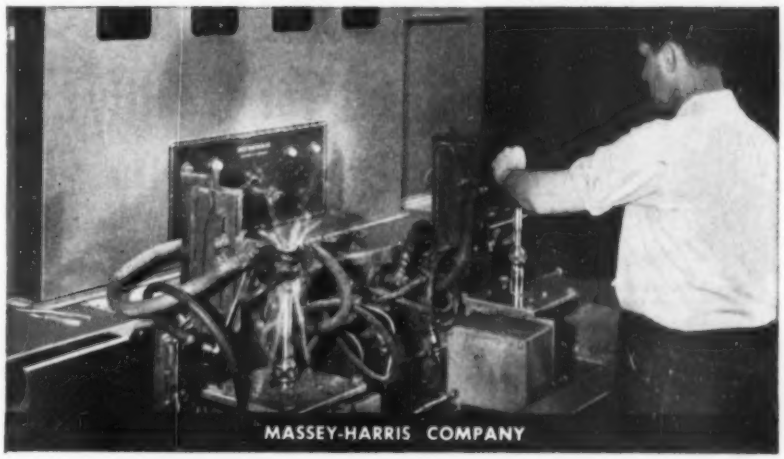
Rotary Dividing Table Provides Greater Capacity Under Tool

Rotary dividing table, said to be the thinnest now being manufactured anywhere, has been designed by its makers, Hayes Engineers, Ltd, of England, to give more capacity under the tool on all milling, drilling, and jig boring machines.

Low-priced, high-precision table is supplied with an inspection certificate showing maximum error through 180° to be 0.00025.

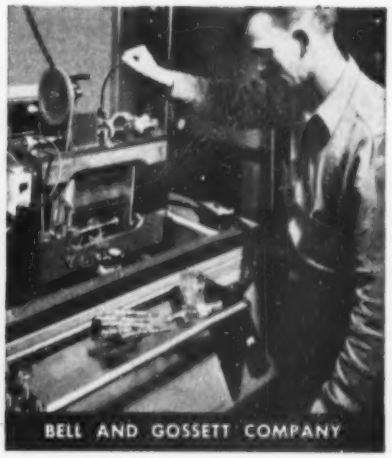
Worm is fitted into eccentric quill

Industries


MASSEY-HARRIS COMPANY

across the nation

SEABOARD AIR LINE RAILROAD


BELL AND GOSSETT COMPANY

UP Production with Westinghouse Induction Heating

Production rates upped by 50% to 2000%! Time savings up to 80%! Space savings up to 90%! Figures like these in company after company tell the Westinghouse story. Across the nation, Westinghouse installations are saving time and money—and doing a better job to boot!

What is your heat-treating problem? Hardening? Annealing? Heating? Metal Joining? Westinghouse Induction Heating may be the answer.

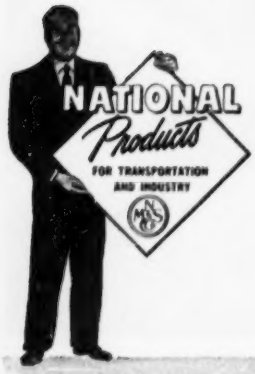
For full information write: Westinghouse Electric Corporation, Electronics Division, Department 62-3, 2519 Wilkens Avenue, Baltimore, Maryland.

YOU CAN BE SURE...IF IT'S Westinghouse

J-02262

Castings by National

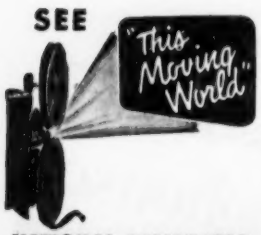
selected for Quality and Dependability



Products bearing these familiar trademarks have all established enviable reputations for quality and dependability.
These manufacturers *continue* to procure castings by National—one of the Nation's largest founders.

National's unparalleled experience in producing malleable, heat-treated malleable, and steel castings is at your disposal. Sales offices and engineering facilities are located at all five strategically located plants. A-5240

PLANTS LOCATED IN Sharon, Pa., Cleveland 6, Ohio, Indianapolis 6, Ind., Melrose Park, Ill., and Chicago 50, Ill.



A 16mm technicolor film. Narrated by Edwin C. Hill, this 27-minute film tells how malleable iron is made . . . tested . . . used . . . how its production economy, ductility, machinability, toughness will give you a better finished product. Available for group showings.

NATIONAL Products FOR TRANSPORTATION AND INDUSTRY

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY
CLEVELAND 6, OHIO Est. 1868

assembly for disengagement; dead stop is fitted to permit re-engagement to correct position. Large, accurately divided micrometer dial is attached, in addition to a divided ring around periphery of table. Movable zero datum facilitates reading by operator.

Tables are available in 11- and 12-in. dia sizes; lined cases provided prevent damage in storage.

Imported by: International Machinery Div, British Industries Corp, 164 Duane St, New York, NY

Florline marking machine is now equipped with a third retractable wheel acting as a line guide 18 in. forward of the carriage. Three-wheeled suspension facilitates operation and keeps machine on the track before marking begins. Both regulation Florline, priced at $97.50, and Florline-X at $98.75 for lines within an eighth of an inch of partitions, will be equipped with wheel line guide at no extra cost.

H C Sweet Co, 24396 West 7 Mile Road, Detroit, Mich

Lightweight Anco relief valve for both low and high pressures has only one moving part and requires less space for installation. Unit relieves and equalizes excessive pressure of oil, water, or chemicals to a predetermined setting, and protects pumps by allowing through-flow, acting as a coolant. Available in aircraft and standard pipe sizes in materials suitable to application.

Anco, Inc, One Baker St, Providence, RI

Chelsea power-line direct-drive duct fan, Type PLFX is recommended for temperatures up to 110 F; available for higher temperature on specification. Fan is enclosed in a steel drum with rear- and front-mounted flanges; motors are totally enclosed. Available in sizes 16 to 48 in.; 2900 to 37500 cfm.

Chelsea Fan & Blower Co, 639 South Ave, Plainfield, NJ

Thermocouple-protecting tube is available, made of Incoloy, with physical properties similar to Inconel, but using half the nickel content. New product has been NPA-approved for use in reducing atmospheres over 900 F and in neutral or oxidizing atmospheres over 1400 F.

Minneapolis-Honeywell Regulator Co, Wayne & Windrim Avenues, Philadelphia, Pa

Visit the Tycol Exhibit!
American Society of Lubrication Engineers
Hotel Statler, Boston, Mass.
April 13-15

...with TYCOL lubricants on hand!

Take metal fabrication, for example. There's a Tycol lubricant for any application you can name: For instance, what about tough machining jobs? . . . Tycol Afton cutting oil keeps cutting edges cool . . . lengthens tool life between grinds. Machine tool hydraulic systems? . . . Tycol Aturbrio oxidation and rust inhibited oils keep them running smoothly. Open gears of metal forming equipment? . . . Tycol Amaclac lubricants cling like cat hair on a serge suit. You always get top performance with Tycol lubricants. Why? . . . Because each Tycol grease and oil is manufactured from high quality base stocks and *tailored* for a specific application. Get the full story of the entire Tycol line from your local Tide Water Associated office today!

Over 300 Tycol industrial lubricants are at your disposal . . . engineered to fit the job!

REFINERS AND MARKETERS OF VEEDOL . . . THE WORLD'S MOST FAMOUS MOTOR OIL

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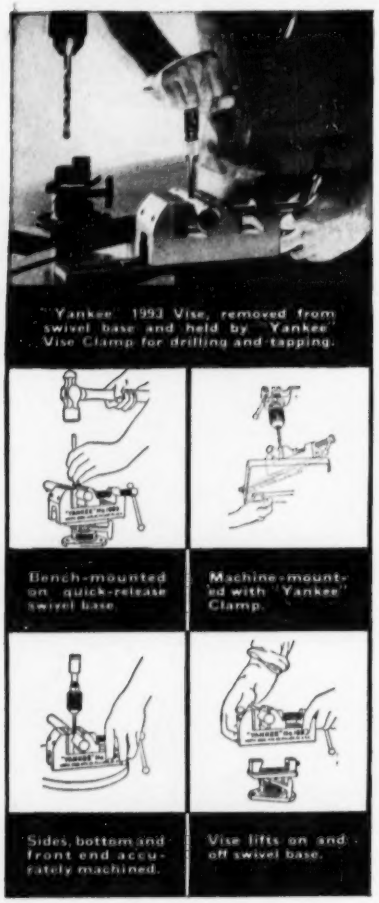
TIDE WATER ASSOCIATED OIL COMPANY
17 BATTERY PLACE · NEW YORK 4, N. Y.

SPEED UP SMALL JOBS with "YANKEE" VISES


"Yankee" 1993 Vise, removed from swivel base and held by "Yankee" Vise Clamp for drilling and tapping.
Bench-mounted on quick-release swivel base.
Machine-mounted with "Yankee" Clamp.
Sides, bottom and front end accurately machined.
Vise lifts on and off swivel base.

Line up small work just once in a "Yankee" Vise for a whole series of hand and machine operations. Four sizes ... 1½", 2", 2¾" and 4" jaw widths ... with and without swivel base. Hardened steel "V" block for round stock. Your industrial distributor has a full stock.

Write for The "YANKEE" Tool Book

"Yankee" Tools now part of
STANLEY
THE TOOL BOX OF THE WORLD

NORTH BROS. MFG. CO.
Philadelphia 33, Pa.

Skid-Not, a transparent plastic floor finish, can be applied with a mop over wood, asphalt tile, or magnesite floors. Product forms a semi-gloss, non-glare finish said to last three to four times as long as wax. Stains can be removed without damage to the finish.

The Monroe Co, Inc, 10703 Quebec Ave, Cleveland, Ohio

Model CB Clark heavy-duty floor truck is made with two arc-welded steel frames without bolts or loose joints, and has rounded corners for safety. Flush-mounted renewable deck is protected by six to eight cross-members per truck. Tilt and nontilt models are available in capacities up to 7000 lb; standard sizes are 24, 30, 36, 42, or 48 in. in width, and 48, 54, 60, 66, or 72 in. in length.

All Steel Welded Truck Co, Rockford, Ill

Line of industrial safety signs printed on heavy fabric with self-adhesive backing will stick to any smooth, clean surface permanently, and are easily removed. Over 200 standard signs are available in two sizes, 2¼x 9 in., and 2¼x4½ in.

Western Lithograph Co, 600 East Second St, Los Angeles, Calif

Wall industrial electric soldering irons for production line use are said to heat four times faster than ordinary irons. Thermostatic action controls heat so efficiently that fusing and tip-burning are eliminated. Irons range from 1 oz to 1000 w, with thermostatic action up to 2600 w; they operate on 110/120 v, ac or dc.

Wall Manufacturing Co, Grove City, Pa

Newly-designed paralleling drafting board is available with rubber desk grips on the back to prevent slipping. Transparent plastic indicator and ruler are attached to the board. Model 2A, 15x19 in., is priced at $4.50.

The Bradford Bailey Co, PO Box 440, Elizabeth, NJ

Merit Type E296 pressure control package unit consists of a diaphragm valve in a free flow pattern, and a simple control unit which can be dismantled, cleaned, and reassembled in less than two minutes. Available with 300-lb valve in standard or V-port assembly with a choice of pressure elements from 10 to 500 lb. Normal operation requires 30-lb air pressure for the diaphragm; some

DESIGN CHANGE TO STEEL CUTS WEIGHT 50%

MANY machine designs can be simplified by proper application of welded steel construction. Less material is needed since steel can be formed at low cost to efficient engineering shapes. Steel requires less machining and often eliminates such operations as milling and drilling required with conventional castings.

At Ilg Electric Ventilating Co., Chicago, Illinois, changing over this end bracket to steel provides several distinct advantages. Material cost has been cut considerably as only half as much metal is needed. Also pound for pound steel costs less than gray iron. After welding components in a simple fixture, the only machining that remains is to drill seven holes. Former milling operations are eliminated.

Although half the amount of metal is needed with steel, the part is actually stronger and more rigid than the original construction. It is easier to clean and paint and costs 30% less to produce.

Fig. 1. Former design *of machine part required milling and drilling. Weighed 18 pounds, twice as much as steel design.*

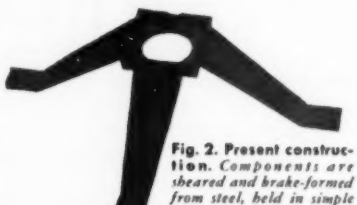


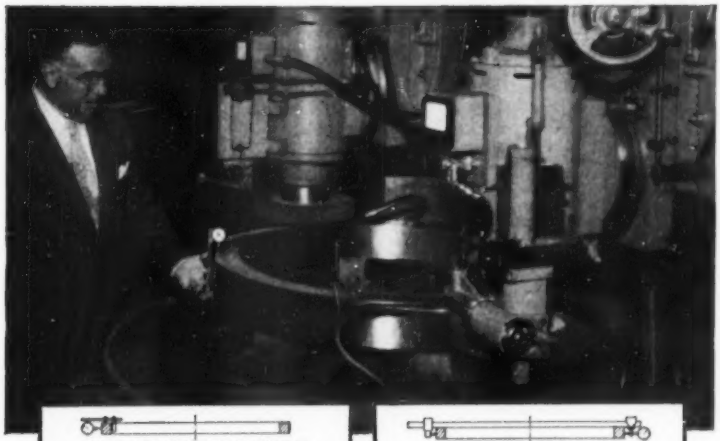
Fig. 2. Present construction. *Components are sheared and brake-formed from steel, held in simple fixture for welding. Bearing housing and arms are 10 gauge metal. Weighs only 8½ pounds. Cost is 30% less.*

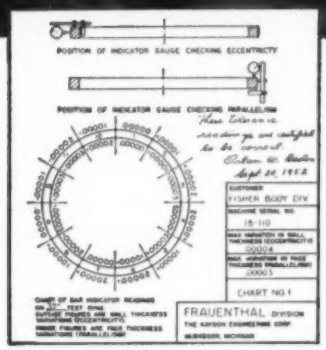
Machine Design Sheets showing how to simplify designs and cut costs are available on request. Designers and Engineers write on your letterhead to Dept. 2003.

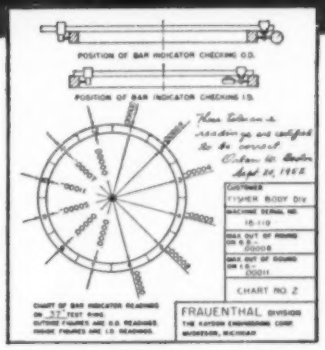
THE LINCOLN ELECTRIC COMPANY
CLEVELAND 17, OHIO
THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

GRINDING TO millionths*

OF AN INCH




POSITION OF INDICATOR GAUGE CHECKING ECCENTRICITY
POSITION OF INDICATOR GAUGE CHECKING PARALLELISM
CHART NO. 1
FRAUENTHAL DIVISION



* *Our normal method of expressing tolerances in tenths-of-thousandths of an inch became inadequate when precision was attained to fractions of tenths-of-thousandths, expressed best in MILLIONTHS of an inch.*

Utmost precision proved by meticulous tests, and certified by Orlan W. Boston, Chairman, Department of Production Engineering, University of Michigan. He witnessed tests at Frauenthal plant in Muskegon and certified their validity on precision grinding of a 37-inch test ring, on Frauenthal Grinder No. 18-110 (shipped to Fisher Body Division for grinding tank bearings).

You get TOP PRECISION with Frauenthal Grinders

The certified readings listed at left are much closer than the 200-millionths of an inch precision specified for these machines. You can get similar results on other sizes of Frauenthal Multiple-Head Super-Precision Cylindrical Grinders, up to 140-inch diameter grinding on the Series 2200 machines. Uniformity of precision is assured in concentricity, parallelism and roundness. You can make many combination settings of grinding-spindle positions for a wide variety of simultaneous grindings of outside, inside and faces. Details on request.

PRECISION GAUGE READINGS • CHART NO. 1

MAX. VAR. IN FACE THICKNESS (Parallelism)				MAX. VAR. IN WALL THICKNESS (Eccentricity)			
Station	Reading	Station	Reading	Station	Reading	Station	Reading
1	.000000"	7	.000000"	1	.000000"	7	+.000020"
2	+.000010"	8	+.000020"	2	+.000010"	8	+000010"
3	+.000030"	9	+.000030"	3	+.000020"	9	.000000"
4	+.000030"	10	+.000030"	4	+.000020"	10	−.000010"
5	+.000030"	11	+.000030"	5	+.000010"	11	−.000020"
6	+.000010"	12	+.000020"	6	+000020"	12	−.000010"

Maximum Variation in Parallelism: .000030" Maximum Variation in Eccentricity: .000040"

PRECISION GAUGE READINGS • CHART NO. 2

MAX. OUT-OF-ROUND ON O. D.				MAX. OUT-OF-ROUND ON I. D.			
Station	Reading	Station	Reading	Station	Reading	Station	Reading
1	.000000"	4	−.000050"	7	.000000"	10	−.000110"
2	−.000020"	5	−.000080"	8	.000000"	11	−.000070"
3	−.000040"	6	.000000"	9	−.000050"	12	.000000"

Maximum Variation, Outside Diam: .000080" Maximum Variation, Inside Diam: .000110"

Series 1800

What is YOUR Grinding Problem?

Through more than a decade of toolroom and production grinding, Frauenthal Grinders have been performance-proved on tough precision jobs, such as helicopters, jet engines, army and navy tanks and gunmounts, Diesel engines, machine tools, 120-inch diameter KAYDON precision bearings and similar products. We'll be glad to work with you on difficult grinding problems.

made in 10 standard sizes . . . conforming to essential J.I.C. specifications

	Series 1800				Series 2000		Series 2200			
Table sizes	30"	36"	42"	48"	60"	72"	110"	120"	130"	140"
Maximum Swing	56"	56"	56"	56"	72"	88"	120"	130"	140"	150"

Ask for Bulletin

Frauenthal Division THE KAYDON ENGINEERING CORP., MUSKEGON, MICH.

PRECISION-GRIND INSIDE, OUTSIDE AND FACES SIMULTANEOUSLY

Backstand Belts cut finishing time 70%

5 minutes on a set-up wheel cut to 1½ minutes with Armour Backstand Belts

Changing from set-up wheels to backstand belts saved 3 minutes 39 seconds in finishing forged paving breaker handles, reports a well-known company*. This operation formerly took 5 minutes 11 seconds. And this wasn't the only saving. Backstand belts outlast 4 to 5 set-up wheels; without dressing they remain flat and true. And due to their uniform grit, they give a better finish.

Belts are only one of the many forms of Armour coated abrasives. There are more than 30,000 different varieties in grit size, backing, etc. We have sheets, disc, rolls, tubes—and specialties to meet your specifications. Your industrial supply distributor will tell you about the Armour line. Call him today!

The complete story of the money-saving backstand belt method is covered in our free booklet offered below. Send the coupon for your copy now!

*Name of company available on request

We recommend buying through your industrial distributor

MAIL THIS COUPON TODAY!

Armour and Company • North Benton Road • Alliance, O.
Please send me your free booklet, "Backstand Belt Polishing."

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Address .....
City ..... *Zone* ..... *State* .....

A

gases can be used directly through the control without necessity of external air supply.

Emmett Machine & Manufacturing, Inc, 2249 Fourteenth St, SW, Akron, Ohio

Tank-type pressure filter for filtering of chemicals, electroplating solutions, oils, etc, eliminates all cloths, papers, screens, and pads. Unit is said to insure controlled-quality filtration and higher flow rates at much lower operating costs in material and labor. Cleaning and sterilization can be accomplished without opening the chamber. Available in all capacities in all metals and alloys, as well as plastic- or rubber-lined for specific problems.

Ogden Filter Co, 4214 Santa Monica Boulevard, Los Angeles, Calif

Machine-side stand is available in a variety of sizes, equipped with 1, 2, or 3 trays and drawers. Unit moves on either feet or casters. Over-all size of model 990-M is 29x18x27 in., shipping weight, 60 lb.

Industrial Bench & Equipment Manufacturing Co, Inc, 98 South St, New Britain, Conn

New non-cutting metal of extremely high density is comprised chiefly of tungsten, with a specific gravity in excess of 17.5 gms/cc. The alloy, which is readily machined with carbide-tipped tools, can be produced in sizes up to 25 in. OD x 40 in. long, and in weights in excess of 1000 lbs. Particularly suitable for static and dynamic balancing and many applications requiring maximum weight in minimum space.

Metal Carbides Corp, 107 E Indianola Ave, Youngstown, Ohio

Plastics guard is being marketed to protect machine drive belts. They were designed to replace steel or cast iron guards which broke under service conditions; they are stronger than cast iron, and absorb vibrations without rattling. Guards can be installed by machinery manufacturers as part of the original equipment, or designed for individual plants for use either as replacement parts or as safety accessories.

Bassons Industries Corp, 1432 West Farms Road, Bronx, NY

Transfer screws and sets are now available in sizes No. 6 and 8 NC. The tool is a threaded center punch used in leader pin die sets for locating open and blind threaded holes;

it aids in definitely locating the die in proper relation to the punch on commercial diesets. Complete set consists of six hardened screws in a combined holder and wrench.

Heimann Manufacturing Co, Urbana, Ohio

Alkalume process, used in preparing aluminum surfaces for welding, thoroughly removes all soils and oxides without harming metal, thereby reducing surface resistance to a value of 0 to 10 microhms. The method is said to assure more perfectly formed welds, free from cracks, in addition to eliminating mechanical cleaning operations. More welds are said to be possible between tip dressings, and at lower pressures.

Northwest Chemical Co, 9310 Roselawn, Detroit, Mich

Standard model Speedylectric steam-jet cleaner is available for operation on 220-, 440- or 550-v ac. Operation of the steam generator, regulation of detergent flow, and atomization with steam at the jet are all under finger-tip control of the operator. Model has been designed for compact portability and safety from fire hazards. It is claimed that a single operator, using the equipment, can do the work of five employing ordinary methods.

Livingstone Engineering Co, Worcester, Mass

Collar or flange nuts have been added to the Reid line of tool components. Made of low carbon steel, case hardened, nuts are zinc-plated for rust prevention. Nine sizes are available for use on bolts or studs ranging from ¼- to 1-in. diameter.

Reid Tool Supply Co, 709 Baker St, Muskegon Heights, Mich.

COCOR CR-39 plastic window sheets have been designed to permit simple, economical observation in cover or base of mechanical equipment as observation ports, lubrication check-points, pressure or fluid level indicators, or protective instrument windows. Acid- and alkali-resistant sheet is available in standard sizes up to 60x60 in. and 38x96 in., in thicknesses from 0.020 to 1000 in., colored or ordered on special order.

Cast Optics Corp, Riverside, Conn.

Line of hand oilers with controlled flow is being marketed as the E-Z Oiler. Model 500 has a 6-oz capacity and is equipped with a removable

TWO MILLION WITHOUT A FAILURE!

parts: small connecting rods

alloy: "600" series metal, a high strength bearing bronze that contains no tin

quantity to date: over 2,000,000

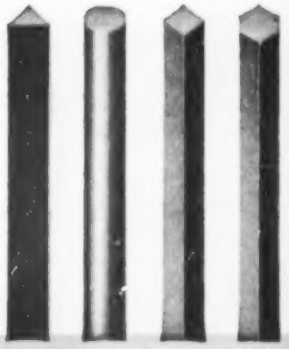
number of failures: none

forged by: Mueller Brass Co.

advantages: no bearing insert is necessary on either the wrist pin or crankshaft end because each rod acts as its own bearing. Dense homogeneous grain structure, close dimensional tolerances and high mechanical properties often permit redesigning for weight savings as high as 15% to 25%. "600" alloys have low coefficient of friction, high resistance to corrosion and tensile strength 2½ times greater than cast phosphor bronzes.

uses: compressors, outboard motors, small high speed gasoline engines. Best results are obtained if they operate against hardened, ground and polished shafts.

"600" SERIES ROD is produced in standard 12-ft. mill lengths and a wide range of sizes and special shapes. This rod has a fine, uniform grain structure and the mechanical properties are rigidly controlled in the cold drawing process. Scrap loss is greatly reduced in machining operations because of the complete absence of defects. For complete information, write us today.



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MUELLER BRASS CO.
PORT HURON 23, MICHIGAN

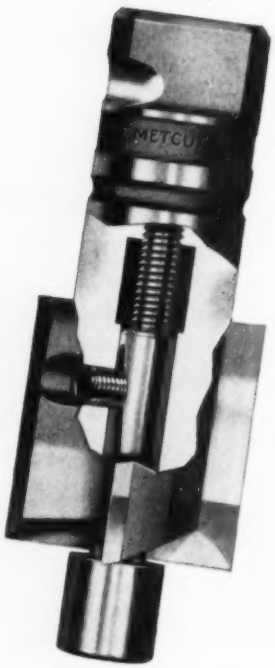
STOP CARBIDE COUNTERBORE BREAKAGE!

✓ NEW METCUT DESIGN BACKSTOPS PILOT

✓ PREVENTS BACK PRESSURE OF PILOT AGAINST CARBIDE TIPS

Metcut Pin Drive Counterbores offer this new Carbide-Tip Design exclusively. Standard Short Pilots, usually used with Stub Taper Drive Tools, are substituted for the conventional long pilots with threaded end and nut. A new back-up screw inserted from the drive-end of the counterbore backstops the end of the short pilot, preventing any movement. This eliminates pilot pressure against the carbide-tips which is usually the contributing cause to carbide-tip failure.

Adopt this New Metcut Design on your Carbide End Cutting applications, and avoid expensive tool failures. Ask your Metcut Distributor for complete information on sizes and prices, or write directly to us for quotation.



METAL CUTTING TOOLS, INC.
ROCKFORD, ILLINOIS

holder and detachable 6-in. rigid steel spout. A 12-in. flexible spout for getting at inconvenient places is interchangeable. Can is leak-proof, wear-proof and perfectly sealed.

K-P Manufacturing Co, 1218 Linden Ave, Minneapolis, Minn

Complete line of safety goggles includes hardened lenses for chipping, grinding, and impact; filter lenses for welding, burning, and cutting; special constructions for dusts and chemicals. Available with metal or plastic frames, with and without side screens, as well as types to fit over prescription glasses.

Pulmosan Safety Equipment Corp, 644 Pacific St, Brooklyn, NY

Molylube Anti-Seize, a highly concentrated molybdenum disulfide compound, is said not to melt at temperatures above 600 F. It is particularly suited for extreme pressure applications. The product protects against corrosion, and prevents seizing and galling at bearing pressures over 100,000 psi. Available in 3-oz single tubes in cartons of 6 or 12, and in 24-oz cans.

Bel-Ray Co, Green Village Road, Madison, NJ

Line of 23 Utica screwdrivers includes round blades, square blades, Phillips style, and stubbies. Blades are chrome vanadium electric furnace steel; handles are amber shockproof Tenite II. Blade lengths range from 12 to 1¼ in.

Utica Drop Forge & Tool Corp, Utica, NY

Southco adjustable pawl fastener is designed for use on doors requiring a small, strong latch. The ½-oz unit in a ¾-in. housing is adjustable to door frames varying from 0 to 25/32 in. thick. Knurled activating knob is slipped through a hole in the door and attached with two rivets or spot welds.

Southco Div, South Chester Corp, Lester, Pa

K-Line HSS twist drills are available in four plastic packages. KB-29 contains 29 drills from 1/16 to ½ in. in 1/64-in. steps. KB-15 has 15 drills from 1/16 to ½ in. in 1/32-in. steps. KB-13 contains 1/16 to ¼ in. in 1/64-in. steps. KB-10 is similar to KB-13, omitting 1113 and 15/64 in.

The Kneisley Electric Co, Toledo, Ohio

ALEMITE OIL-MIST

saved $2400 first year

...extended bearing life from

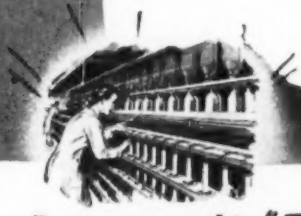
20 weeks to one year and four months

Textile mill breaks bottle-neck, cuts Down-Time, ups Production

Bearing temperatures on an important blower were running 200°. Bearings burned out frequently. Production losses totalled $1000 with each failure. Mill output lagged with down-time for repairs. Here was a bottle-neck that had to be broken! Management turned to Alemite lubrication. Installed an OIL-MIST unit costing little more than a hundred dollars. *Result:* Bearings are still operating with no failures to date—after one year and four months. $2400 has been saved, down-time has been eliminated and production increased!

Compare all these OIL-MIST advantages with ordinary methods!

- Reduces bearing temperatures as much as 20%
- Continuous, uniform lubrication of all types of bearings
- Air pressure seals bearings against dirt
- Reduces oil consumption—up to 90%
- Prevents product spoilage
- Eliminates guesswork—each bearing picks up as much OIL-MIST as it needs
- Reduces starting and running torque.



Facts prove this *"Friction Fighter"* most efficient, continuous, fully automatic lubrication system

All industry looks to Alemite for the latest, most advanced lubrication methods. OIL-MIST, Alemite's great lubrication development, is the famed system that *atomizes* oil into mist—distributes it through tubing to bearings—bathes all bearing surfaces with a cool film of clean, fresh oil. Here is the system that simplifies and materially cuts the cost of machinery lubrication. With no moving parts, the lubricator is the last word in efficiency.

Job Proved and thoroughly tested in hundreds of applications in every phase of industry, OIL-MIST uniformly maintains oil film on plain and anti-friction bearings, gears and chains, despite variations in load, temperature or speed. Don't you owe it to *your* business to learn all about Alemite OIL-MIST—*today?*

ALEMITE OIL-MIST Lubricates All Types of Mechanisms

Alemite OIL-MIST Lubrication

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☐ Please have your Alemite Lubrication Representative arrange a desk-top demonstration of OIL-MIST. This entails no cost or obligation on my part.

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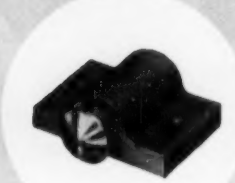
How Much Does It Cost You to Resurface a Die?

When "make shift" spring units are used as part of a die for breaking the oil seal, their removal and replacement during the resurfacing process is time-consuming and costly. When VLIER Spring Plungers are used, they can be removed and replaced up to 10 times faster. This is just one of the *hundreds* of ways these tools are saving industry money.

Other uses include positioning small parts in fixtures for locating pins, detents, etc. Each tool has accurately controlled, constant spring pressures and is guaranteed for trouble-free service. Plunger End completely telescopes and remains aligned at all times. Available in 10 sizes.

BRAND NEW! Just out, are the VLIER Silvernose plungers with lighter-than-standard spring pressures for use under constant, high-speed flexing without spring failure. Available in 7 sizes.



SPRING STOPS

Used where fixture design prevents the use of spring plungers. Made in two sizes, 14 and 32 lbs. end pressures.

If you work with metal, you need VLIER Spring Plungers or Spring Stops.

Send for Catalog No. 52

VLIER ENGINEERING, INC.

4552 BEVERLY BLVD., LOS ANGELES 4, CALIFORNIA

Distributors of Torque Thumb Screws, Toggle Pads and Fixture Keys

Brammertool has been designed to simplify attaching and detaching of V-link belting. Light pressure inserts ends of prongs into standard slots of V-links. Rivet heads can be quickly slipped in or out to make or break connections in belting.

Brammer Corp, 684 Broadway, New York, NY

Dayton Rogers micrometer adjustable spacing collars for milling machine cutter arbors have a new steel alloy incorporated in their construction. In addition to greater accuracy on screw threads, operator is enabled to clamp or tighten milling machine nut arbor up to a given pressure of 20 tons without disturbing micrometer accuracy of cutter arbor adjustable spacers used in gang milling, and similar operations.

Dayton Rogers Manufacturing Co, Minneapolis, Minn.

Line of running time indicator Series ET-1 is available in two models: ET-1A counts to 99,999 hours by hours, ET-1B counts to 9,999.9 by tenths of hours. Standard series operates on 115 v, 60 c, and can be easily altered for use with other voltages. Compact unit is 2-in. dia by 2⅛-in. depth; can be readily adapted for panel or unit mounting.

Vocaline Co of America, Inc, Old Saybrook, Conn

Nava-Mar face plates to protect soft, finished materials from marring by vise jaws are available in ¼-in. sizes to fit any standard make of vise up to 6 in. Fastened by set screw, they become an integral part of the vise jaw, and can be removed by screwdriver. Available in bronze, aluminum, and fiber or babbitt facings bonded to aluminum bodies.

The Kenimar Corp, Greenwich, Conn

Vertical drum lifter, designed to save space, handles open and closed drums. Safety barrel grip, all-steel construction with heavily welded chain, equip the unit for either high- or low-ceiling applications.

Palmer-Shile Co, 16018 Fullerton, Detroit, Mich

Towmotor Model LT-60 lift trucks are now equipped with the No-Spin differential designed to give full power to both drive wheels under a variety of operating conditions. New adaptation compensates for differences in wheel speeds when turning in either direction.

Towmotor Corp, Cleveland, Ohio

PHILADELPHIA

Worm Gear Reducers

...GIVE YOU ALL THESE FEATURES

Worms are of alloy steel with carburized, hardened and tempered threads (both shaft and threads are accurately ground *after* heat-treatment.)

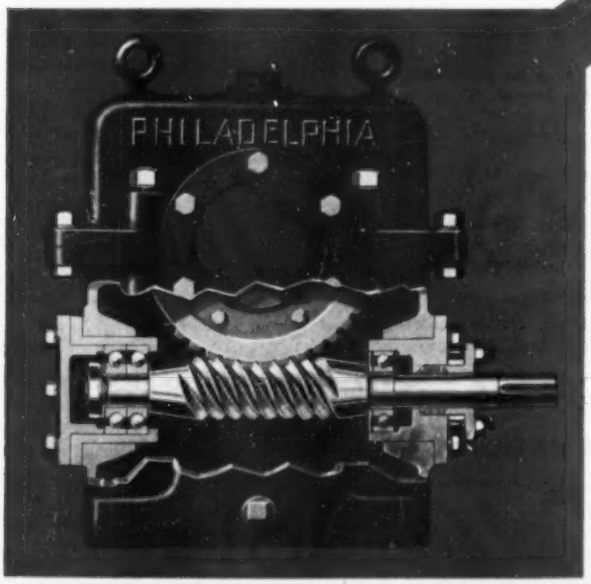
Worm Gears are of highest quality chill-cast nickel bronze.

Bearings are anti-friction types (ball or roller) best suited for smooth, quiet, long-lived operation.

Housings are Quality Grey Iron, compact, rigid, neat and of ample radiating surface (to prevent overheating).

Lubrication is by Splash Systems to all moving parts—in oil-tight housing.

A.G.M.A. Ratings are carried by all Philadelphia Units.



Units are available with *Worms above or below the Worm Gear* for Horizontal Drives, or with shafts extending *up or down* for Vertical Drive requirements . . . all in single or double reductions. And, for very efficient Right Angle Drives, there is a complete line of Philadelphia *Helical-Worm Gear Reducers.*

For Vertical Drives requiring long unsupported shafts, there is a complete line of Type VTS Units, known as *Philadelphia Vertical Steeple-Type Worm Reducers.*

Send for 88 page *Worm Reducer Catalog,* which gives full data for ordering; diagrams; installation views; section views of all units, etc.

Philadelphia Gear Works, INC.

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Industrial Gears and Speed Reducers
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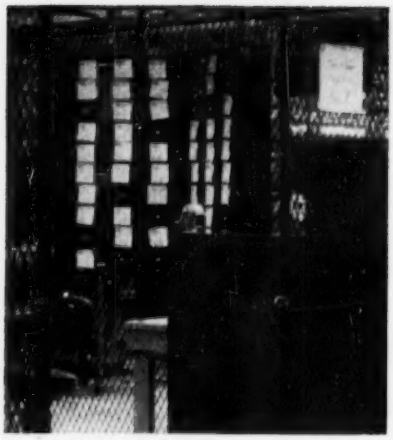
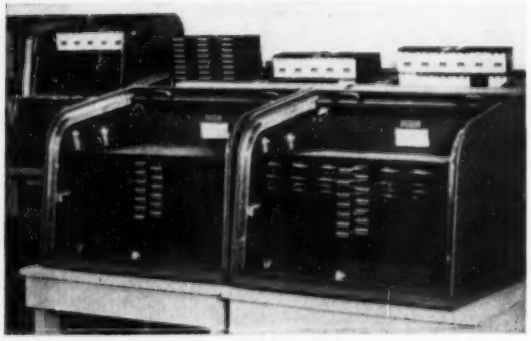


How McCaskey Gage and Tool Inspection Control has helped achieve:

HIGH QUALITY CONTROL STANDARDS in RECORD TIME in NEW AVCO PLANT

AVCO'S Bridgeport-Lycoming Division achieved high standards of Quality Control in their new plant in a very few months. The simplicity and effectiveness of McCaskey Control procedures were readily adapted to their needs and have played an important part in their entire program.



The following facts concerning it are taken from "Maximum Tool-and-Gage Control" by Harry M. Baldwin, General Foreman, Quality Control, Bridgeport-Lycoming Division, AVCO Manufacturing Corporation, Stratford, Conn. The article appeared in a recent issue of "Factory Management and Maintenance."

Their objectives were first, to place control of gages, tools and instruments in the department responsible for inspection of them, centralizing records and inspection. Second, to use a minimum of forms and filing equipment.

Their accomplishments in less than a year include:

. . . effective centralized control. No gages or measuring instruments out of tolerance are being used.

. . . low initial outlay for McCaskey visible clip-spring wall boards and cabinets with capacity available for growth to twice the items now handled.

. . . minimum paperwork and, as a result, low unit cost of control.

. . . rapid accumulation of information on history record cards from gage tags and other sources for dependable guidance in planning future activities.

Similar results can be accomplished in your plant with McCaskey Controls. You can adapt them to your requirements, as AVCO and numerous others, large and small, have done.

Let us send you Mr. Baldwin's complete article and additional information on McCaskey Gage and Tool Control. Our Industrial Specialists are available to work with you. They are well qualified through practical experience to offer constructive suggestions. No obligation of course.

MAIL COUPON FOR COMPLETE INFORMATION

THE McCASKEY REGISTER CO.
ALLIANCE, OHIO

Please send the AVCO Bridgeport-Lycoming article reprinted from "Factory" and additional information on McCaskey Gage and Tool Control.

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ROUND TABLE Discussion

SHOP WORN

THERE IS something wrong with top management when they suddenly decide to tie the can to a foreman with ten to twenty years service, and who is admittedly 100% loyal. This is especially true when it is known this foreman is active, and has at least ten years ahead of him.

Apparently this foreman is loyal to the firm but does not see eye to eye with some other part of management. It might be that someone higher up failed to realize that cooperation is a two-way street.

Constant changes in management mean constant changes in methods, and sometimes take the heart out of the foreman. He never knows whom he is working for or with, and is in a constant state of insecurity. Under such conditions he might just as well look for something else. The company has a responsibility to these long-service foremen. If they decide he has outlived his usefulness, they should so inform him and give him full pay until he finds something else, or connects with another company.

I have seen many of these so-called washed-up foremen go out with a burning desire and make good elsewhere.

It is lack of understanding of the other fellow's function or their lack of understanding of ours that causes these things to happen. The least any firm can do for an old and trusted employee is give him a chance to save face.

A E Salmons
Philadelphia, Pa

•

BAIT FOR SPEED

TOO OFTEN WHEN problems arise today we think in terms of yesteryear, instead of facing the facts under present-day conditions. Living in the past in industry is just as dangerous as stepping in front of a moving train. Both will result in death, or at least in a maimed existence.

Our problem of getting more production from present-day workers is not similar to the problem of twenty or more years ago. Our present-day worker is not the same man, nor does he live in the world of yesterday. He is alive to present conditions. He knows what Plant X in town Z is doing, and how much money is being paid the workers. He has been recently schooled in thinking that our

industries are all slavedrivers and that it is possible to always increase the rate of pay on each and every job in the plant.

We must face these conditions whenever we analyze current-day problems. When the problem of how to increase production arises, the foreman's first natural reaction is to say "give him a raise." This will induce him to produce more of the company product. But does it? Usually the answer is no. More often the productivity of the department stays the same regardless of the base rate increases.

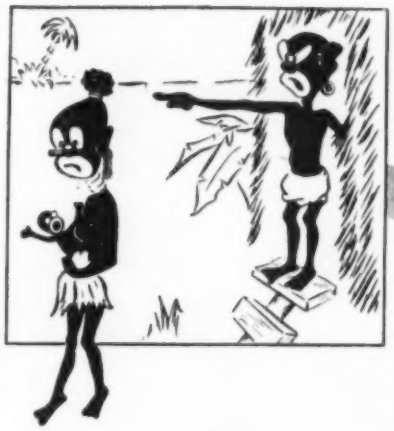
Why is this? As near as anyone can figure out, the answer can be summed up in a few words; no work measurement, and no incentive for the worker to strive to increase his effort. He gets paid regardless of output. True, if the worker does less than before he stands a good chance of getting laid off, but who is that foolish in our working class?

Our workers today have better educations than ever before in the history of this country. They are, therefore, capable of planning their own strategy and with a little prodding by newspapers and friends, they go a long way in deciding when they can squeeze a company or a foreman for more money. Why should our foreman not realize the problem and be ready to cope with it?

Usually this problem arises in the smaller companies of 500 or less employees. It is these companies who too frequently do not have dynamic leadership. They still feel that they own each worker—body and soul—and that their workers should just love to work for the company regardless of wages, hours, working conditions, or anything else.

It is these companies that do not train their foremen, and their foremen are left on their own to decide to use five and ten cents' an hour raises as a means of increasing de-

"Maybe we oughta tell him about the hydraulic press . . ."



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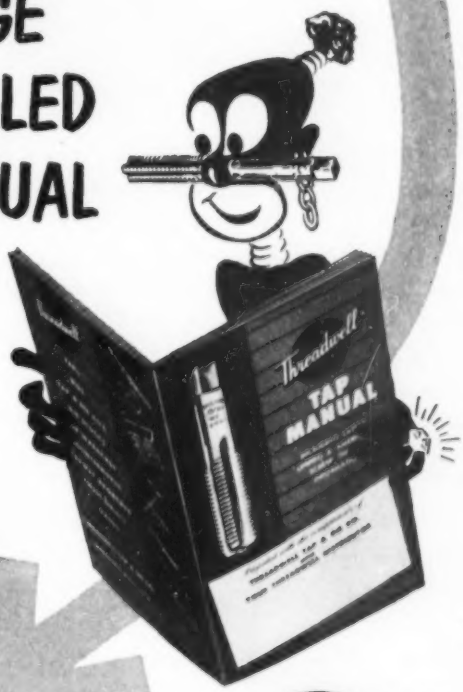

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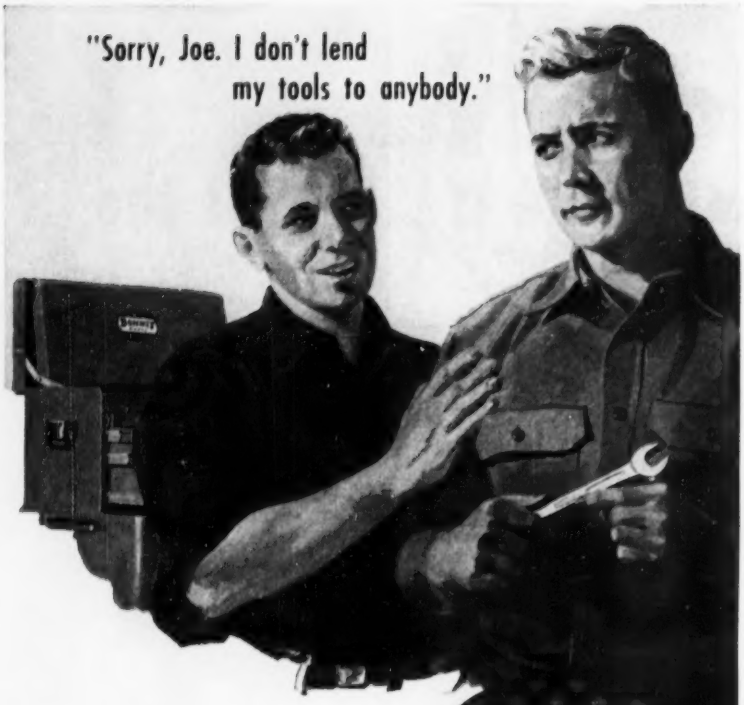

"Nothing personal, understand. But you should have learned long ago to build your kit around good tools.

Look at those Bonney tools of mine. Cost less than you think, and for my dough the best any mechanic can buy.

If you're short of cash right now, get yourself some BON-E-CON* wrenches. They're real mechanics' tools with the regular Bonney guarantee, and priced so that an apprentice can afford them.

With those as a starter, before you know it you'll build up to a kit like mine."

BONNEY TOOLS

* The new Bonney economy-priced line

Remember. Your local Bonney jobber, as well as Bonney, stands behind the tools you buy. He has Bonney tools priced to fit your needs as well as your budget.

This is the way the men who buy their own tools feel about them. More and more foremen who are responsible for production figures recognize the value of this attitude on the part of mechanics.

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partment production. They know no better because they were never taught the basic requirements of handling money and labor. They frequently shudder at the thought of record keeping when a plan of merit increase is suggested.

Can this be corrected? Yes, but the company officials must be willing to devote time, and must insist on the foremen learning how to do their job and applying what they learn.

How then can we get an increase in production? The best way is to know what is a proper day's work and insist on each worker doing that much, using with this a good merit-rating system where individuals who do consistently better than average work can be properly compensated. Remember, I said first we must know what is an average day's work, what the standard is. This is not a guess; it is a properly established productive figure per hour or per day.

The ultimate method is an incentive program where the company actually compensates the worker for all effort expended over the average amount. The simplest form is a percentage basis applied to the weekly output of the worker. It is easily figured and the worker knows where he stands. This plan of incentive, or in fact any of the more complex incentive plans, will increase productivity. Here is a tool that our small companies must sooner or later use. It is the "bait for speed."

Charles D Townsend
West Hartford, Conn

•

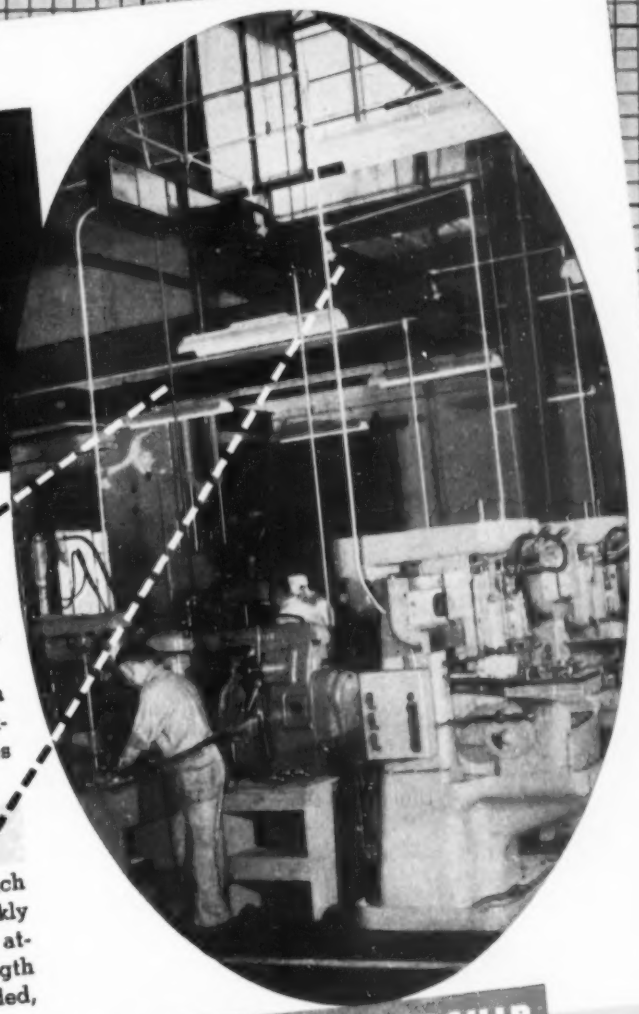
CAN WE DEPEND upon the individual to do his utmost in times of necessity, or should we tempt him with a carrot—give him a little inducement in the form of a reward of some kind. You know what happened to the little eating place that depended upon its patrons' honesty in naming their own price for what they had consumed—it doesn't live there any more!

I just inject this apparent irrelevance to bring to mind the fact that human nature is peculiar—undependable at times—and necessitates a stimulant of some kind in order to bring out its best. From my reasoning it seems to me that if the scheme of self appraisement was worthy of continuance, the Wall Street Beanery would still be dishing out hot dogs at "you tell us how much a throw."

Whether we depend upon a man's honesty to say how much he should pay for his belly full, or how much effort he should put forth in doing

for time-saving, money-saving

POWER DISTRIBUTION



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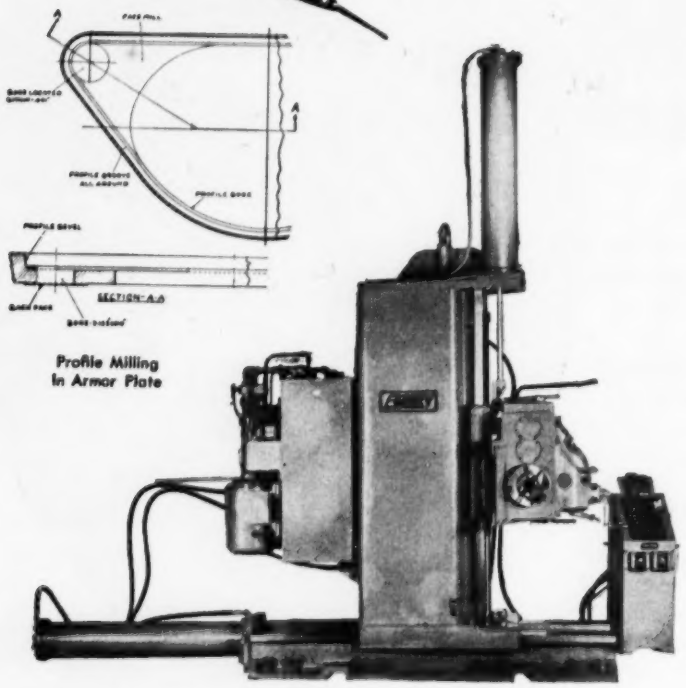

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—UNRETOUCHED PHOTOGRAPH

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a job, the basic thing at the bottom of his reasoning is pure unadulterated honesty. One man's conscience may be slow-geared, while another one may be microswitch-operated. The saliva-producing carrot that shifts the jackass's gears into high is the catalytic agent that gets him to move.

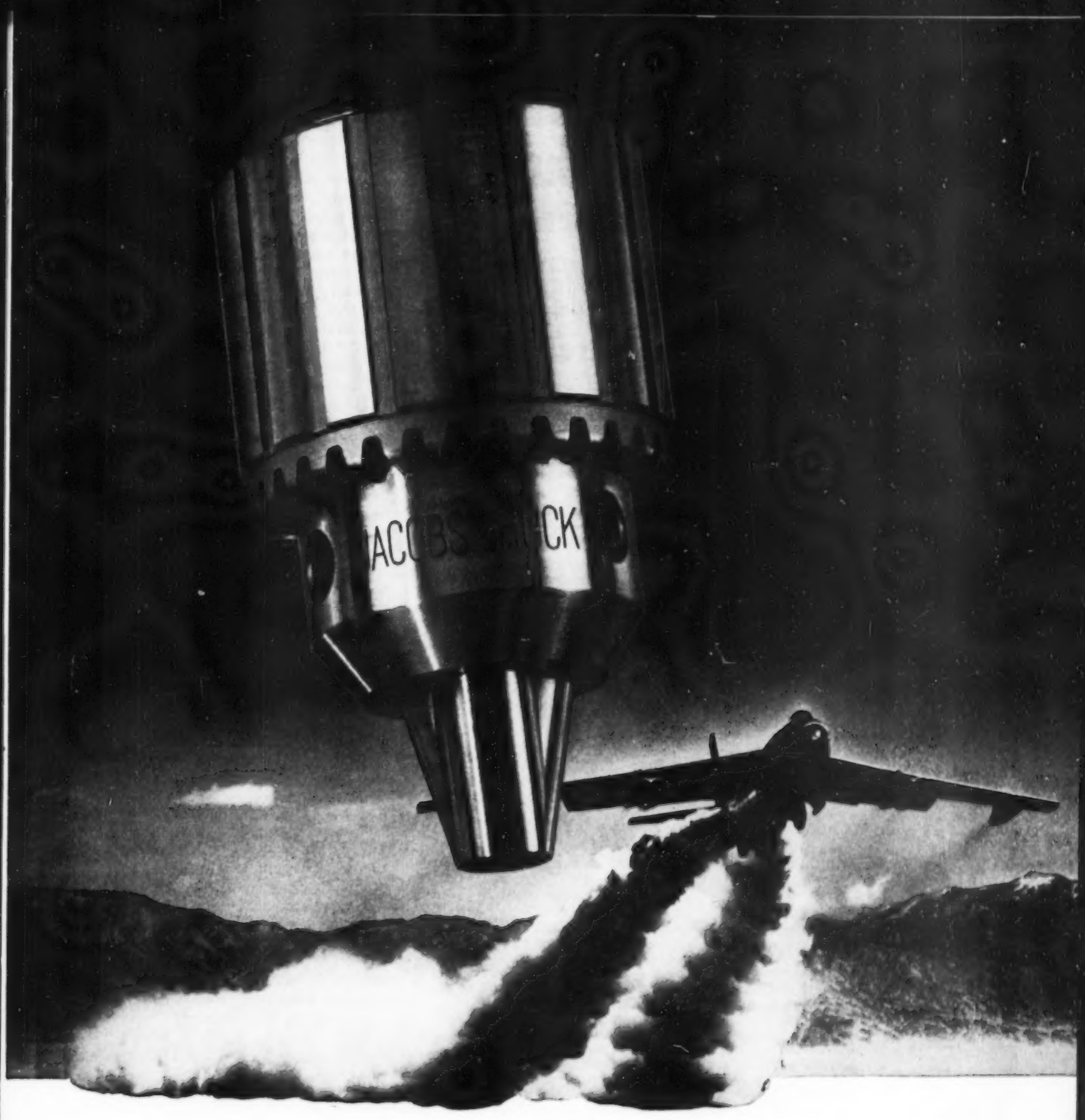
In days of yore, when wages were low and jobs were scarce, the foreman put the pressure on with threats. There were no rewards other than the satisfaction that you were still on the payroll.

As production became more complex, something had to be done to snap the worker out of his lethargy. Things were brightening up for him, and he developed a little independence. The work had to be turned out, and in order that no time e lost unnecessarily, we instituted out, and in order that no time be the piecework idea to get it out in the shortest possible time. We called in the stop-watch specialists and lost-motion wizards and eventually dumped the job into the worker's lap with a card attached which would inform him that he would get so much for each piece. The yellow vegetable in this case was the feeling that the worker had of the chance to make a killing.

Some brilliant mind conceived of the bonus idea, another carrot-bait contraption used to break down the worker's lassitude and get him to get the lead out. Some shrewd firms have rewarded their help with stock certificates occasionally as a reward for meritorious service. What better way to make a worker feel that he was working for himself? If I know human nature, I know that if a man is working for himself he knows that all the effort he exerts will eventuate in his own behalf.

I cannot agree with the idea that special rewards for doing one's best

"Yeh . . . he still works at the factory . . . but it's been fully automated!"



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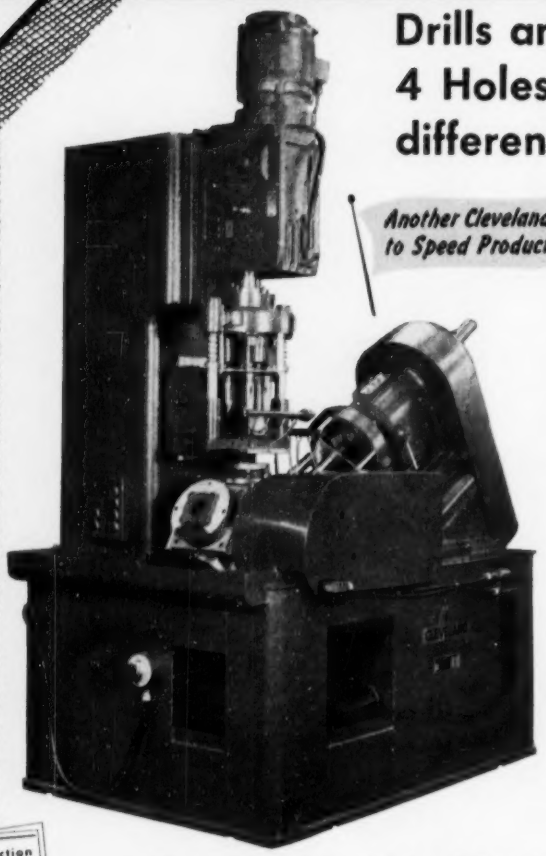

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The power driven 6 station drum index unit of this new Cleveland machine is designed to accomodate 12 different parts. No clamping is required—the parts automatically drop off into a chute. The 4 spindle multiple head is adjustable. Estimated production at 100% efficiency is 343 pieces per hour.

With the precision lead screw feed more perfect pieces per hour are possible on Cleveland machines. By combining several operations in one machine and tapping groups of holes at one stroke Cleveland engineers are able to realize greater speed with proportionately lower operating costs.

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CLEVELAND lead **tapping machines** screw

on emergency work is outdated. From my observations it has always paid off. Of course, I am an old-timer, and have been out of touch with the latest in production methods, but I cannot conceive of incentives being eliminated entirely. I cannot convince myself that human nature has changed any in all this time. You can lay a few bucks on the barrelhead, and come out a winner, that the worker has not become so pious as to disregard his own interests in a couple of decades.

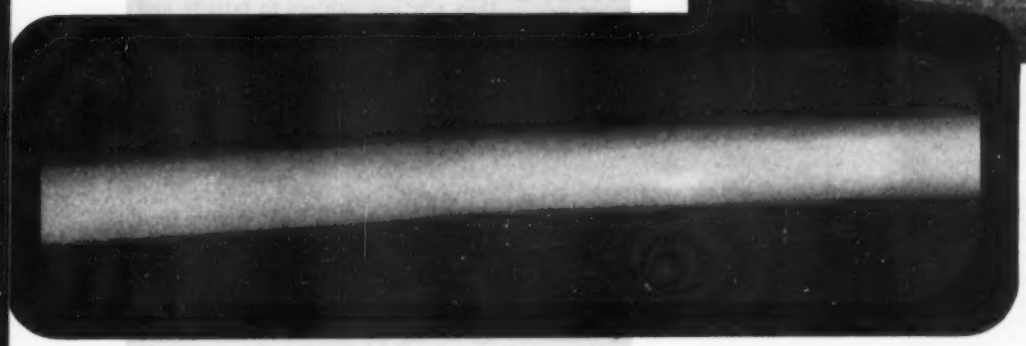
I've seen a half-dozen men spurned on to do their damndest, aroused to productive fury by dangling a few bottles of liquid amber before them as a reward for getting a machine in running order.

These thirsty workmen jumped in to get this important machine back in operation at the earliest possible date—working straight through for 36 hours and, believe it or not, they come out frothing on top. The way those fellows worked you'd think that their lives depended upon it. In a way they did. It happened at a time when that stronger than two-per-cent was as scarce as crocodile warts. The head of the plant was on the inside of the alcoholic supply. Well, to make an interesting story foam at the top, the damaged machine, which had caved in from old age, was rejuvenated and performed as good as new. The fact that the men had to take a couple of days off to sober up didn't detract from the fact that a special award performed the necessary miracle to get the production rolling again.

A fellow doesn't necessarily have to be a jackass in order to struggle after a carrot. Dangle something in the form of a reward before him, and he'll do his best to break the tongues from the wagon. It's all very well to give orders to have a

ITS JOB IS "HUSH-HUSH"

—but



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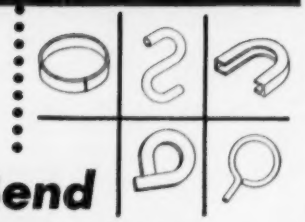

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job done by a certain date, but you can't leave out the factor of individual effort. The date may be unreasonable or it may miss its mark, but that special inducement has a certain amount of kick in it that never seems to fail.

I have a feeling that workers as a general rule are reasonable and will not take advantage of a situation in which a reward has been offered to overcome something that needs a speedy remedy. I don't mean that the idea of rewards should be run to the ground. My contention is that rewards should be offered at times of great emergency. There are times when they serve as atomic stimuli to assist in correcting something that needs to be done in a hurry. Needless to say that a hurry-up without the carrot gets monotonous if practiced too often. I've seen some foremen so ingrained with the hurry-up idea that it became second nature with them, and the men soon got wise and paid no heed. When a real emergency occurred he got the horse laugh and all his efforts were in vain. In a sense, the guy ran out of carrots.

J Homewood
Ontario, Calif

•

CHOW CHALLENGE

SHAKESPEARE ONCE SAID: "How use doth breed a habit in a man!" So it is with a great many shop workers. The habit of bringing the daily lunch box from home and eating lunch around the machine instead of getting a balanced meal in the plant cafeteria is a hard one to break.

In my estimation, the new order from the front office relative to the plant lunch period is a good one. Prohibiting eating in the plant at the machines during the lunch period is not regimentation, but good plant management. Eating at lunchtime should be confined to the plant cafeteria in the interest of both worker and management. This order will result in greater cleanliness in the plant, better housekeeping, added stimulation for the workers from the change of scene, and, in the long run, better morale.

Prohibiting eating of lunch at the machines could hardly be interpreted as regimentation. Of course, it all depends on how management puts it to the men. It's easier to catch flies with honey than with vinegar. If management bluntly tells the men: "Eat, drink, and be merry, for tomorrow you diet," they may resent management's interference with their eating habits. Rather than stress the value of eating at the plant cafeteria to get a better and more balanced diet, management should bring out the advantages of change of environment at lunchtime, and making the shop a cleaner place to work in.

I believe that most workers will not be hard to sell on the benefits derived from substituting a hot, well balanced meal for the lunch-box variety. When men are fed properly, they are less subject to fatigue and enjoy a far greater measure of good health. Improvement of the diet of workmen is followed by increased output without any increased effort, and also by a reduction in number of accidents.

It is reasonable to believe that many workmen do not come to work with enough of the right kind of food to enable them to do a truly good day's work. Good management tries to improve, wherever it can, the nutritive value of its workers' meals by having the plant cafeteria insure better balanced meals for its employees.

Of course the new order about eating in the lunchroom may not accomplish its secondary purpose of getting the workers to give up the lunch box in favor of the plant lunch. It should not be supposed that just because planned eating is a good way to keep fit, it is therefore of interest to every worker, and that there will be a rush to the plant lunchroom. On the contrary, it is difficult to get the average

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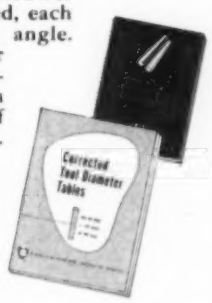

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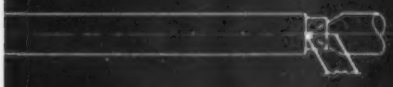
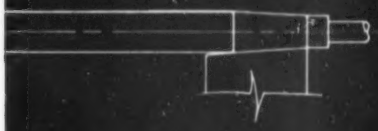


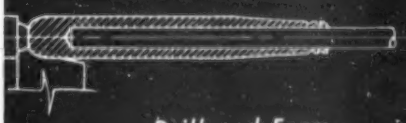
Box and Center

Drill and Support



Support and Form

Thread



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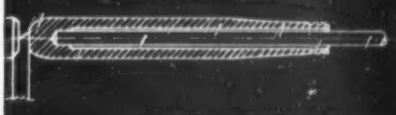

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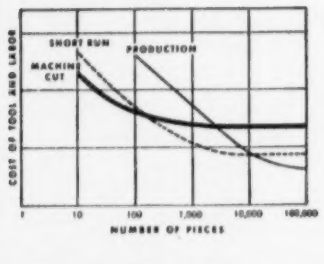

This logarithmic chart shows the effect of these factors on the **specific part** illustrated. From 1 to 150 parts, our own **Machine-Cut Method** with no die cost whatsoever is most economical. At 150 parts, the **Short-Run Method** using economical blanking dies and stock punches is best. At 10,000 units, the standard **Production Method** with standard dies is most satisfactory.

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STAMPINGS DIVISION

LAMINATED SHIM COMPANY, INC.

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man in a shop excited about nutrition.

There can be no question that the plant with a good cafeteria is able to offer better means for getting nutritious meals to the workers than the lunch box from home. It is easier than trying to educate the average housewife to pack a nutritious, well-balanced lunch. However, it may be hard to break the habits of employees accustomed to bringing their lunch from home and eating the noonday meal at their machines. It might take some reasoning with them to convince them that the plant lunchroom does provide a place where food can be eaten more comfortably and leisurely.

There is another good reason for having the men eat in the plant lunchroom. Most modern production is repetitive, and ofttimes monotonous. This repetitive work builds up tension which results in increased fatigue. Such fatigue may cause accidents, impair the worker's skill and judgment, or cause him to be less accurate. To ameliorate these conditions to some extent, lunch at the cafeteria will fit into the pattern of permitting a change of scenery, and allow for relaxation amid new surroundings. It will reduce fatigue and make for a higher health standard.

There are those who say that where the worker eats his lunch is his own business, and, especially, what he eats is a matter of his own taste and choice. Of course there can be no quarrel with the worker's control of what he eats, but management does have the right to say where he eats his lunch while he is in the plant.

Lunchrooms have been in operation in industrial establishments for at least 50 years. However, it was not until the last war when experience demonstrated both the importance of having a nutrition program for workers and facilities within the plant to serve employees warm meals at a low price, that the plant lunchroom began to get the attention it deserves. The location of plants in areas lacking eating facilities, plus longer shifts, combined to make employers "warm meal" conscious.

A well-conducted lunchroom really makes a nutrition program effective. In judging the efficiency of the plant lunchroom, the following should be taken into consideration: food—is it of good quality and well cooked? Is there a sufficient variety at fair prices? Sanitation and equipment—are the kitchens and dining space clean, adequately equipped for prompt service, and well ventilated? Is the lunchroom personnel adequate and qualified to give satisfactory service?

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Most employees like the sociability of the company restaurant, and appreciate having a comfortable place to eat a meal. A cheerful cafeteria will make even an ordinary meal seem like a feast.

The two most satisfactory lunch services for industrial plants are the lunch counter and the cafeteria. The plant lunch counter aims merely to distribute food without providing tables or other facilities for eating. The workers go to the counter, buy what food they wish, and then hunt a place to eat it. The cafeteria, on the other hand, in addition to distributing food, is equipped with chairs and tables so that food can be eaten leisurely and comfortably.

In order to gain the full cooperation of employees to eat at the plant cafeteria, and eliminate gripes and complaints arising out of the feeding problem, management can share some of its responsibility on in-plant feeding with an employees' committee, elected by the employees from among themselves, to consult with the management on lunchroom problems. This committee may be advisory, or carry full responsibility. It should be kept in touch with questions of finance, labor, and administration of the plant lunchroom. There is thus a small group of well informed employees to handle worker complaints and confer with the company on lunchroom policies.

The chow challenge of the lunchroom order may not be all milk and honey to many workers who will find it hard to break the lunch box habit. When you take a group of men who have eaten lunch around their machines for years, and force them to chase down the length of the plant to the lunchroom, you've got to expect some beefing. But the proof of the pudding is in the eating. The proof of the wisdom of prohibiting lunch-box eating in the shop will

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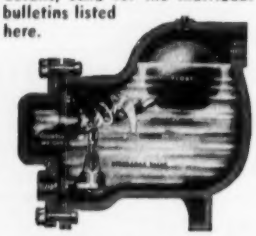

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soon be apparent to the workers in assuring better meals and better health for the workers, and better morale as the end result. Management knows that providing the opportunity to eat better meals is recognizing that the way to a worker's heart may well be through his stomach.

H Kaufman
Philadelphia, Pa

•

I WOULD THINK that it was the right of the employer to say where his employees can or cannot eat their lunch, but if he is so dictatorial as to insist, then he runs the chance of creating bad feelings between his employees and himself.

It's a funny thing, this eating business. It may be that I am unduly prejudiced about it, but in my days as a machinist, dressed up in overalls which at times were not fit to be presented to royalty, I looked forward to that half hour of fellowship with my buddies.

We used to line up on the bench like a bunch of blackbirds on a line, each being provided with his favorite nosebag—some of which looked like the fenders on a car driven by a careless woman. This was the time of day when the boys gave vent to their feelings. Some of them amused us with their latest jokes; some normalized their inner pressure by telling their foreman off while he was out of hearing; and others just sat and enjoyed their lunch.

We didn't have elaborate cafeterias in those days as most of the more up-to-date firms have today and had we, I doubt if the boys would have preferred it to the junk-laden bench. There's a certain good-fellowship—a hail-pal-comeradery engendered in this bench association that could not possibly prevail in the spick-and-span atmosphere of a cafeteria.

As far as my memory serves me, we were not unduly annoyed by rodents on account of a crumb or two left by the men; in fact, some of the boys would deliberately leave a tasty morsel in a certain spot, knowing that their four-legged friends would show up to snatch it and high-tail it out of danger. You've heard of baseball-pools, fight-pools, and what-not-pools, but have you ever heard of a mouse-pool? It got to be quite a game to have half a dozen of the fellows chip in a dime apiece. The fellow whose mouse showed up first won the pool.

So much for the little rats; now for the big ones who are so wrapped up in their own ego as to think they can

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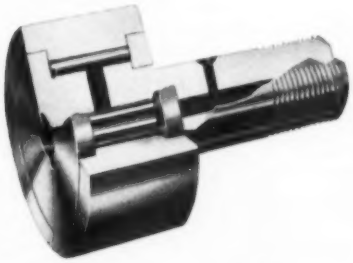
Machinery manufacturers are finding that even at slow speed, it is difficult to carry the usual heavy radial and intermittent shock loads of cam application efficiently on plain bearings or standard antifriction ball and roller bearings. With increasing speeds, and lubrication limited by the desire for simplified design, the plain bearing wears excessively and fails early. Ordinary ball or radial roller bearings used on a shaft as cam followers have a



tendency to split in the outer race because of the excessive strain on the thin and superhard race sections.

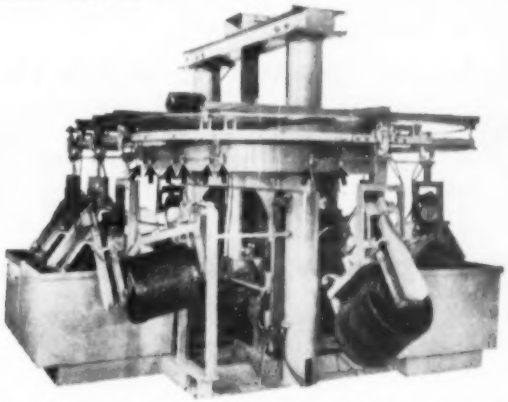
One bearing that has proven particularly successful in cam follower applications is the Multirol CF series full type roller bearing. This bearing is built especially for the repeated shock loads of typical cam action operations. The outer race section is not only heavy radially but is also martempered to combine maximum toughness with adequate surface hardness for withstanding the punishment of cam applications. The outer ring operates on a full complement of small diameter rollers so the load is evenly distributed over a greater bearing surface. The inner race and flange are made in a single piece with the stud, preventing any possibility of disassembly in operation. Greater accuracy is maintained throughout longer bearing life and, compared with plain bearings, both starting and rolling friction are reduced to a minimum. As a result internal wear is diminished and power requirements of Multirol bearing equipped machines are appreciably lessened.

Load Capacity Comparison

To illustrate the increased capacity of the Multirol CF, here is a comparison between a Multirol CF-1 bearing and a corresponding friction type roller, making use of the maximum permissable bearing pressures in pounds per square inch of projected area. The CF-1 bearing will have a maximum of 2240# while the equivalent friction type roller would have a capacity of less than 400#.

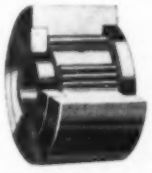
What This Means in Terms of Performance

The James Hunter Machine Co., of North Adams, Massachusetts replaced units consisting of a standard roller bearing and hardened roller with Multirol CF bearings on eccentric cams that actuate rake teeth in their wool washers. The changeover reduced their original and replacement costs over 10% and reduced maintenance to occasional lubrication. Where previously, rollers only lasted a maximum of several months, no replacements have been required with the Multirol bearings. As a result, the Multirol Bearings solved a trouble spot that brought in many customer complaints.



Crown Rheostat and Supply Company of Chicago uses up to 200 Multirol Cam Followers as guide and support rollers in the travel and transfer mechanism of their cleaning, plating, and drying machines. Formerly trolleys were suspended from rails but the cam follower units proved to be a more precision means of friction reduction and added stability to the supporting arms.

Other McGILL® Bearings



MULTIROL CYR

MULTIROL SE

GUIDEROL CT

A new 140-page Bearing Reference Guide complete with 30 pages of vital engineering data has just been released by the McGill Manufacturing Company. It has the full story on the advantages of Multirol CF Bearings as well as information on the Multirol CYR, Multirol SE and Guiderol Bearings. Send now for your copy of McGill Catalog No. 52.

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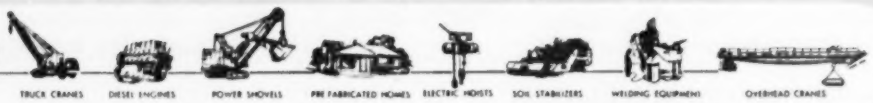

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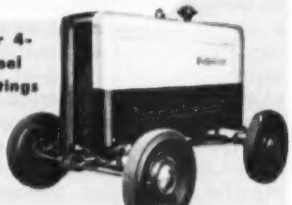

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dictate the gastronomical habits of their workers.

There are two things that I am particularly allergic to: one is glare, and the other thing is noise. Especially do I object to the latter when I am eating my meal. Now whoever heard of a cafeteria that didn't sound like a boiler shop, with the dishes clattering about and the boys shooting off the breeze? Ever hear such a clatter along the shop bench occupied by a dozen or more happy men? Oh, you get the breeze in a way, but it is a gentle breeze compared with the constant bla-bla-bla of the crowded cafeteria.

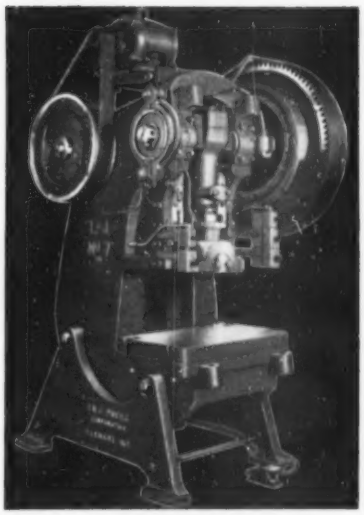
Bear with me for a moment while Bill Yutz extracts his wife's preserved peaches from the little jar and Tom Glynch strains desperately on a cold steak sandwich—both of them blissfully happy because of the loving hands that prepared them. It is possible that food of equal savory and nourishing values may be served in the company hash-house, but one is taking chances on getting what one likes.

Then again, a man has his pride to consider. He hasn't the time to wash up and change in order to be at ease among so many strange faces. If he does, he has to make the most of his time by gulping down his food in order to get back to the shop in time for the starting bell.

Another objection that the average shopman has in eating in the company cafeteria is that he suffers a feeling of inferiority when lined up with the white-collar guys.

We all know that the modern Yutz has to be careful with his change, and for that reason seeks to economize by carrying his bucket with food that he knows is wholesome and clean—I mean no reflection on the cooks of industry. None of us likes

"It went through one ton of strip and one setup man's wrench."



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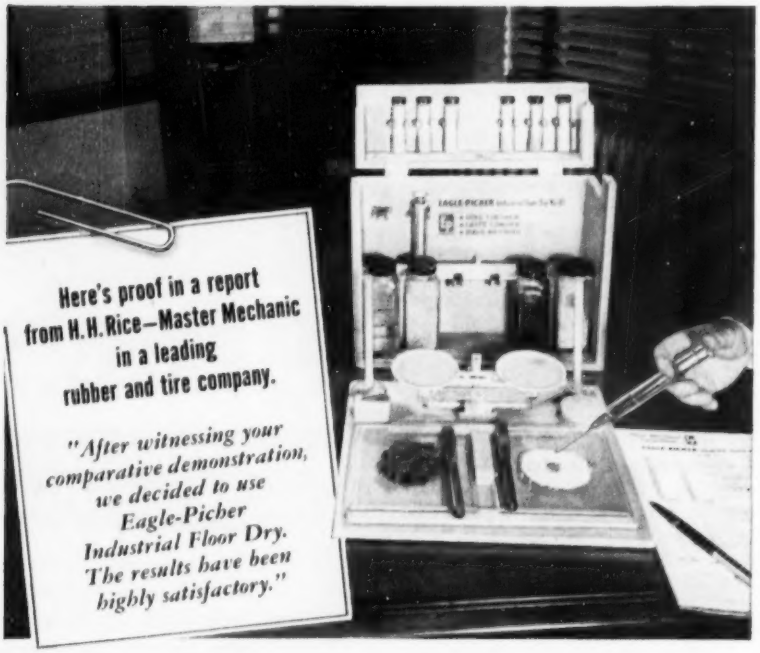
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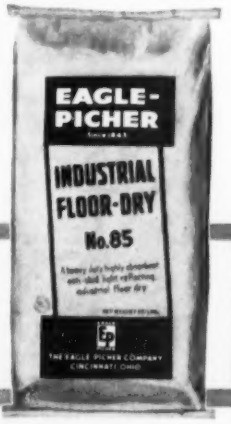

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paying through the nose for what we eat, and by carrying our own grub box we know that we are on the safe side.

No, give me the bench and my pals to talk to when eating my grub—let me enjoy my food to the fullest in the element of companionship and comfort. Besides, if I ate in the cafeteria how would I get those little gadgets home now and then?

I attribute the failure of a duodenal ulcer from getting me down to rugged intestines developed through years of delightful gormandizing sessions accompanied by cheerful companions who sat with me along the bench in ye old shoppes of yesteryear.

J Homewood
Ontario, Calif

•

WELL, OF ALL things! Now old Ed shows up his true colors by trying to kill a splendid idea that I have been harboring since graduating from the drillpress department into the kitchen. If workers would only give a moment's thought to what they would save their wives by being civilized and eating from a plate instead of digging into a box, they'd be getting somewhere.

I think it is about time that someone put his foot down about this slovenly habit acquired by some men. As for me, I'd rather go without my lunch than to have to scratch around in the depths for the same old thing every day—it's time that someone took the initiative about doing away with the old grub-bucket.

I would look upon a firm with great pride that had done away with the time-worn lunch-box and had all its workers eat where they could get a warm, well-balanced meal every day. Anything that contributes to raising the health level of the employee is worth consideration. However, I'd go a step further and have the men served complete meals and not let them exercise their weak prerogative of helping themselves to pie and cake, the nourishment of which would only add to their sitting acreage.

This idea of sitting around with a bunch of guys spinning yarns may be all right once in awhile, but I'd think the plan brought up by Mr Robertson, and so bitterly opposed by our super-conservative Ed, was originally conceived with the idea of developing the worker morally, physically, and spiritually. Good food, not the kind that the usual wife throws in from across the kitchen, eaten in an enlightening environment, tends to bring out the best in a man. It's a certainty that his health would im-

prove having well-balanced meals instead of the indigestible junk some of the poor fellows have to swallow. Building up the resistance of an employee by proper feeding insures a great reduction in lost time from sickness and is one of the strong points in favor of the company cafeteria.

I would think that the men would appreciate a change of scenery, as well as mingling among the other members of the organization with whom they come in contact so seldom.

From a housewife's viewpoint, one who has experienced the depressing period of a packed lunch in industry, I will say that my life would be much easier to face were my husband to chuck his so-called nosebag on some dump and show some appreciation to the firm by patronizing its cafeteria. I know that my husband's health and spirits would be considerably better were Robertson's scheme put in force generally. Why, a cowboy's chuckwagon would be a marked improvement over his bench gangup that is conducive to nothing but hours of physical misery and untold periods of mental deterioration.

Evelyn Roundbottom
Laguna Beach, Calif

•

THE QUESTION OF when and where to eat has been given considerable thought and has provoked much discussion in quite a few plants, but I have yet to hear of one where management went out on a limb to the extent of prohibiting a man from bringing his lunch box into the shop and eating there during the noonday break.

Frankly, I doubt if this prohibition will carry as much weight as the late and unlamented Eighteenth Amendment. Like that noble experiment, it is more likely to be honored in the breach than in the observance, because, apart from the economic factor involved, the average shopman is a creature of habit and is resentful of anything designed to upset what has become a pleasant interlude in the day's routine. From my own experience of the average plant cafeteria, I am inclined to go along with him.

Yes, I know all the arguments for the plant cafeteria sound alluring—that hot meal in the middle of the day—the hygienic aspect of clean surroundings and good food prepared with an eye to the consumer's health. For a while these talking points are pretty well realized, then inevitably there is a decline. The cafeteria, from the shopman's viewpoint, becomes a place of clattering dishes and blaring

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radio, a place that one has to dash to and stand in line for service, and after being served, scurry around to find convenient seating arrangements. With the usual half-hour noonday break, this doesn't leave much time for enjoying even the best of food and getting back to the shop to punch a time card.

When you contrast this with a lunch box meal in the noonday quiet of the shop, put up by the little woman with an eye to your culinary likes and dislikes, most shopmen will take the lunch-box meal.

Then let us examine it from management's viewpoint. It costs money—a sizable amount of money—to build, staff, and equip a modern cafeteria. With today's high prices it becomes more and more difficult to provide attractive meals that will fit the worker's pocketbook, unless management is prepared to foot the bill and accept the loss as added overhead. Very few companies are paternalistic enough to do this.

If Al's company is really concerned about getting the men to eat outside the shop, there is a plan which might solve their problem. One concern I know of, employing about eighty men, has a large room set aside where the men can eat their lunches. In addition, a local catering concern provides a hot meal, sandwiches, or a beverage if desired. This room is comfortably equipped with chairs and tables, also various magazines and periodicals. It was suggested that the men use this room—there was no hint of compulsion involved—and over a period of years the response has been almost one hundred per cent. Once a month the room is used for an evening get-together sponsored by a shop committee of the employees who have various types of entertainment, movies, or a speaker on some topic of interest.

Beside fulfilling the original idea of having the men eat away from the shop, this idea has brought a considerable amount of employee goodwill—all at very little outlay.

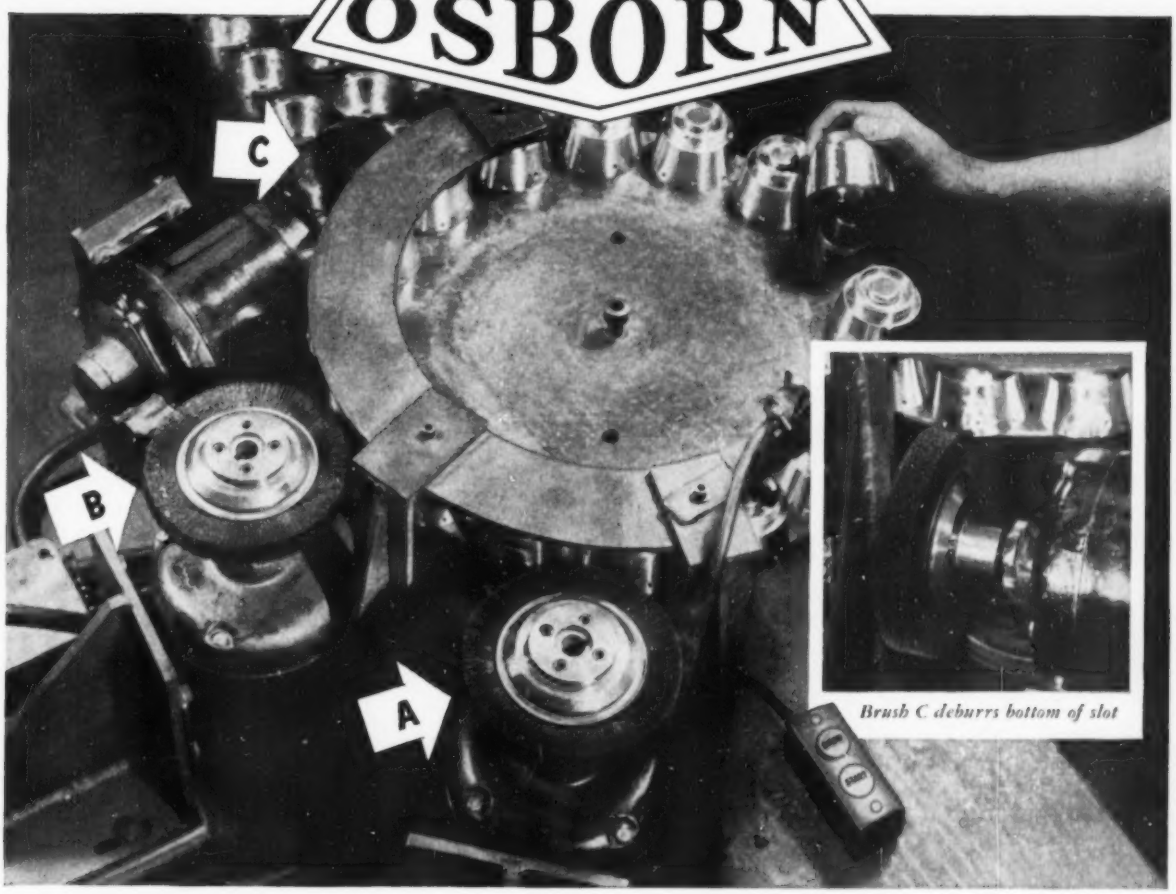
To sum up, the average man dislikes anything that savors of compulsion, but will react favorably to suggestion.

Robert S Alexander
Greenville, RI

•

WITH OUR MODERN trend toward better living conditions,, the industrial world also has attempted in many cases to improve working conditions and to reduce hazards. One of the recent moves along this line has been to "clean up" the eating habits of the employees. To do this, both large and

OSBORN



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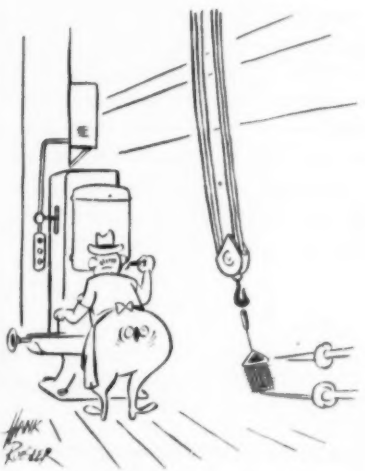
small companies have engaged either an outside source or established an inside arrangement to serve food to the employees. Some companies have gone to the expense of establishing a room in which lunch is served. No stipulation is usually set on the use of this room. Therefore, any employee may bring all his own food or he can buy his food and still use the eating area. The surroundings are kept clean and the room is usually painted with color or colors chosen to relax the individual while he is eating. It truly is a movement to help the employee to have a better working life.

Now the question of whether this life is better than to just open up a lunch pail amidst the chips and oil, and eat a cold sandwich and drink "pop" is hardly debatable. Who wouldn't rather sit in a clean place and eat? Yet it is true that some people still desire to cling to the old ways and eat amidst the rubble.

There are several good reasons why employees should be requested, then instructed, to eat in a cafeteria. One of the most important is the health angle. True, our forefathers did not eat in such fancy surroundings—but neither was the life span as long as it is today. This indicates that better living conditions do help one to live longer.

Another point to consider is hazards. To allow eating in the shop does present certain hazards. Waste, old papers and the like get thrown around, and they will cause accidents. A most serious accident was caused recently by a carelessly tossed wadded up piece of paper which landed on a stairtread. It caused an employee to fall several steps and severely injure his back and a consequent loss of several weeks employment.

The waste and other odd items left



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over from lunch attract rats and they are most undesirable to have in the plant. They are destructive and will attack human beings—rat bites have been known to have resulted in death.

The eating of lunch anywhere in the plant and the negative results of such practice costs the employee and the company many hundreds of dollars each year.

A company naturally has an educational problem when it is just introducing a cafeteria program. First, proper instruction must be given the foremen on why it is worthwhile. We must always remember that the foreman has to answer many questions. He must be well prepared to do so and he must not be allowed to go unguided in his answering. This idea of allowing foremen to make company policies is most dangerous because no two individuals think just alike. So you end up with several policies, and no company can operate successfully under such conditions.

Have your foremen point out the advantages of eating in a clean room; have them tell their boys that a change in environment helps them to relax body and mind. Make it known that the use of the cafeteria is not just a "whim of the old man," but is a step toward a better place in which to work.

Selling is what we need in our industrial companies today. Personnel departments are included as the first spot for the change. Too much is left to the foremen without help or guidance from those service organizations within the company. Never sell good ideas short—they pay off both in working and eating.

Charles D Townsend
West Hartford, Conn

•

THE LUNCHROOM IS a fine idea and should be encouraged. The food is usually good and it does keep the work place cleaner.

I would, however, resent anyone telling me how to eat, where to eat, and what to eat. We must keep in mind the fact that lunch-time is employee's time, not the employer's. We cannot dictate to employees on their own time what they should do, unless they are breaking a shop rule.

The employees are under orders for 8 hr a day, 40 hr a week, and I am quite sure they would be resentful of any attempt on management's part to dictate when they eat. It is the employee's job to do the best he can on his particular assignment. If he behaves himself he should be

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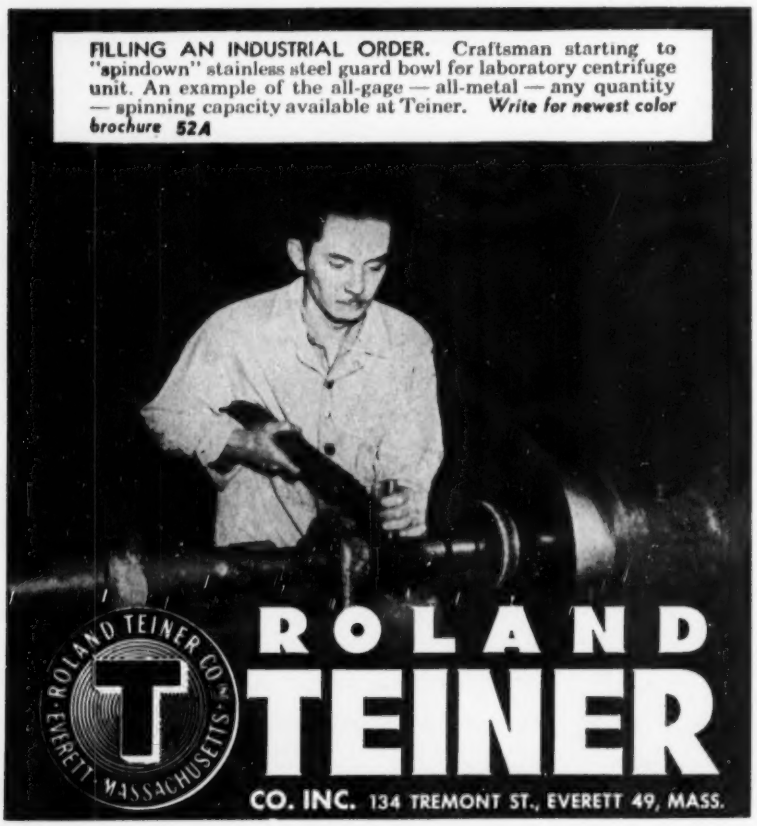
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left to do as he pleases on his own time.

It is such methods that drive the employee to the protection of a union. Fortunately most management executives are human and do not go for dictatorship methods.

A E Salmons
Philadelphia, Pa

•

IF THE BOSS in Al's and Ed's shop gives an order that everyone has to eat lunch in the shop's cafeteria, he certainly proves to be a poor manager of his company. Such dictates are unworthy of any executive and leader of industries today.

Everybody anywhere in the democratic world has a right to eat his lunch wherever he chooses. This is part of the liberties he enjoys in being a citizen of a country where right is right and wrong is wrong, as opposed to lands ruled by dictators, where brutal force has been substituted for righteousness and fair play. If Al thinks this is not so, and resolves to support such silly orders, he's a very poor adviser to his employer.

Those who bring their own lunch boxes have good reasons for doing so; otherwise they wouldn't do it. Some of the fellows do it because they want some certain kind of food, or the food prepared in a particular way. They may figure they save money, or it might be too far to walk to the cafeteria, and sometimes they have to wait too long for service, etc. I have personal experience of all these reasons while working as a machinist, designer, or as an executive in Europe or America.

If the personnel manager is able to advance adequate reasons as to

"Boss—my wife is coming to visit during Open House. Could you get me a male helper for a few days?"

why this edict should be accepted, he should be appointed general manager, because he must be a man of unusual ability—a man far above average. If he has the ability to convince people that such foolish demands are good for them, then he should be able to work wonders in the highest positions.

But trees don't grow up in the heavens, and that's a good thing. If they did, then many things we now think are wrong would be right, right would send us to some concentration camp, or to jail, exactly as is done behind the Iron Curtain this very day in Europe or Asia.

I recommend to Al and the personnel manager that they read the book "I Chose Freedom" by Victor Kravchenko. Perhaps after that they would realize what precious things democracy and liberty really are—liberty to eat the way everybody feels is best for himself, liberty to work where one chooses, liberty to live where one desires, and liberty to dress and spend the money in the way each man thinks is best for himself.

If a company wants all its employees to eat hot lunches, it should provide such facilities, and make the prices so attractive the workers couldn't resist them—but every man should be given the privilege of choosing for himself.

Changing the environment once in a while is very good, but this is not the main issue in the discussion. And notwithstanding the fact that it is better to eat a balanced meal at noon hour than a couple of sandwiches and a cup of coffee, the precious principle of liberty is at stake and must be protected. Therefore, Al's and the personnel manager's arguments must in this case be turned down.

A E Fristedt
Stockholm-Bromma, Sweden

•

IT LOOKS TO ME like a mark of progress to have all the employees eat their lunch in the cafeteria rather than to have them carry their lunch. This lunchbox carrying deal is out of date and, like many other things which we hate to relinquish, wherever possible should be done away with.

I don't mean that a man should go hungry, but if the company has his interest at heart sufficiently to provide a cafeteria, then he should take advantage of it and do his share of patronizing. It is better for the man's physical interests to partake of a well-balanced meal at noon than to have something cold. Provid-

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ing food for the stomach is getting to be a science and one can readily see that the contents of a man's lunch pail is anything but that.

You'll find those who object to eating their meals in a well-ordered dining room simply because they hesitate to change their long-established habits. Eating from a dented box or paper bag is one of these habits. You'll find many a man will object to eating in a cafeteria—he doesn't feel at home in one, and would rather mingle with his cronies in some dark corner of the shop or, perchance, in back of the old steam hammer where he can sit at ease on the pile of soft coal. This fellow is worth trying to convert. Once he gets used to the idea of broadening out—mingling with the other employees—he'll become a great booster and, incidentally, be able to show some degree of independence at home. To put a taboo on eating in the shop will result in a fight at first, but in time it will result in an uplifting of the morale of the whole shop.

Where is the comparison between pawing around in a metal container, or a paper sack, and withdrawing something that is cold and practically tasteless, and the heart-warming satisfaction of eating a well-balanced meal in an environment uplifting in every respect?

It may seem that one is saving money by carrying his lunch, but in the long run it proves expensive. Many a doctor bill is credited to the damaging effect of ill-planned snacks contained in the dented container carried beneath the worker's arm.

Frank Van Horn
Auburn, Calif

•

THE MAIN DIFFICULTY about trying to impose a ban on the eating of meals in the machine shop is the impossibility of deciding whether a man is eating a meal or whether he is having light refreshment. If a man is eating salted peanuts and drinking water, is he having lunch or a light snack? He may be a food crank and peanuts and water may be his diet. The executive who tried to decide whether or not the man was trying to defy the ban on eating meals would be placed in a rather silly situation and would expose himself to the ridicule of the shop personnel.

You cannot impose a ban on one form of eating and permit another at the same time. Either there must be a complete prohibition on eating of any kind or the abandonment of

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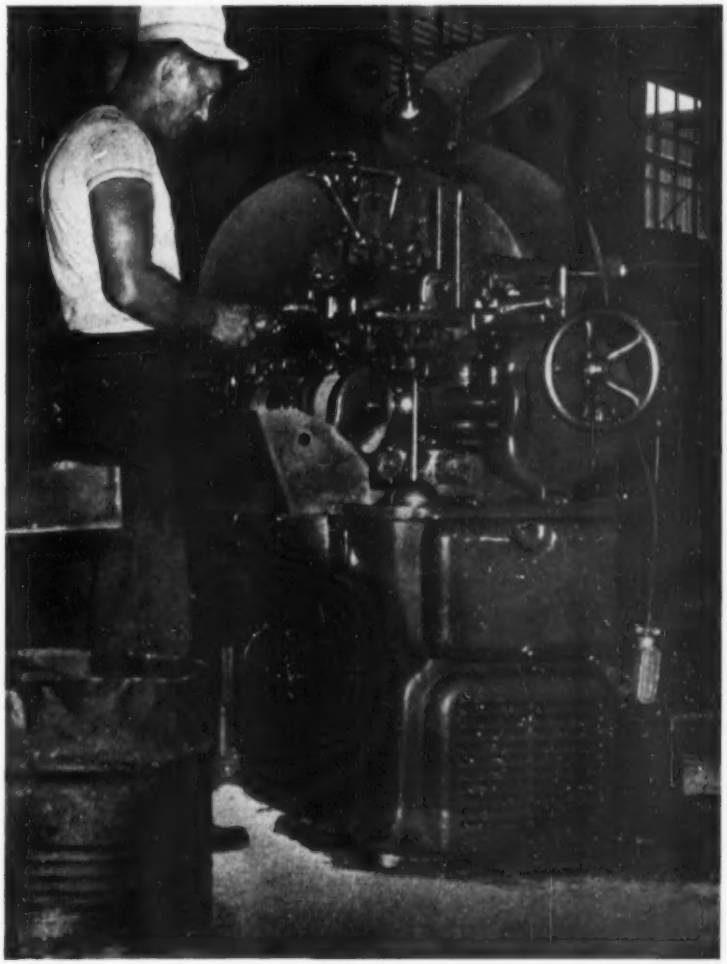

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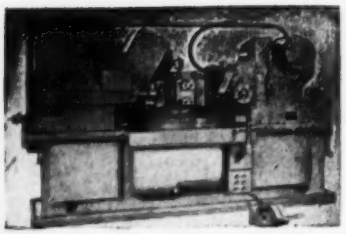

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a rule which, in the first instance, should not have been imposed at all There is sufficient evidence to show that the ten minute refreshment period during morning and afternoon working periods is conducive to higher production and if a rule is imposed which bans the eating of lunch and still permits the morning and afternoon refreshment periods, then the inconsistency of the two opposite practices smacks of high-handed despotism. Trouble will ensue in no small measure.

A similar state of affairs can be found in shops which prohibit smoking in the same working area where oxyacetylene torches are in use. The imposition of the no-smoking rule in such plants costs thousands of man-hours a year of productive labor which spends an unusual amount of time in the men's room having a few illicit drags.

Persuading men to stop eating sandwich lunches in the shop and to have a hot meal in the firm's cafeteria is worth trying. But the task should be tackled by propaganda, in a manner similar to that used for the promotion of plant safety, and not by the imposition of rules which cannot be enforced and which smack of despotism. Some catering firms who specialize in the running of factory cafeterias have some excellent arguments in favor of the mid-day hot meal and these should be publicized as much as possible by the bulletin board and articles in the plant magazine.

We have had a lot of intensive experience in Britain of mass feeding methods in industrial organizations. Started as a war time expedient, the works cafeteria has become an established national institution so that the majority of firms now have facilities for supplying employees with a hot mid-day meal. The works canteen, as we prefer to call it, is helped financially by government

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	6T33	0–½"		No. 33	2 11/16"	3 1/2"	1 15/16"	7.50
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	4B	0–¼"	½"–20		1 3/4"	2 3/16"	1 5/16"	5.20
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	3D	0–⅜"	⅜"–16		2 7/16"	3 1/16"	1 13/16"	6.30
TAPER BACK MEDIUM DUTY	4T1	0–¼"		No. 1	1 23/32"	2 5/32"	1 5/16"	5.20
	4T2	0–¼"		No. 2 (short)	1 25/32"	2 7/32"	1 5/16"	5.20
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backing; to what extent this help is given, the writer is not certain but the scheme persists and is proving very beneficial to the health of the working population.

One way that we have found to encourage the eating of canteen lunches is to adjust the price to the lowest possible figure so that the food offered is such a bargain that few can resist it. In some circumstances, a two-course canteen lunch costs less to the worker than it would to buy the raw materials for making up sandwiches. Also, since meat is still rationed in Britain, the canteen lunch is attractive, in that extra meat is added to the diet, over that obtained by the family ration-book allocation.

Price adjustment is worked in another ingenious way to insure that the properly cooked hot meal is eaten at mid-day. The canteen department runs the refreshments for morning and afternoon breaks and brings around hot tea and light pastries. It was found, in the early days of the canteen scheme, that some employees ate a very sketchy lunch and filled up with the bulky and starchy foods brought to them on carts during the refreshment periods. To discourage this practice, the prices of light refreshments have been raised to top retail value so that the employee thinks twice about paying highly for food of low nutritive value. The excess profits made on light refreshments help to defray the cost of the mid-day lunch and reduce its price to an attractive figure.

One very strong argument which can be made in favor of a balanced mid-day meal is the way in which it helps to counter malnutrition. Many people eat a lot of food but still suffer from malnutrition owing

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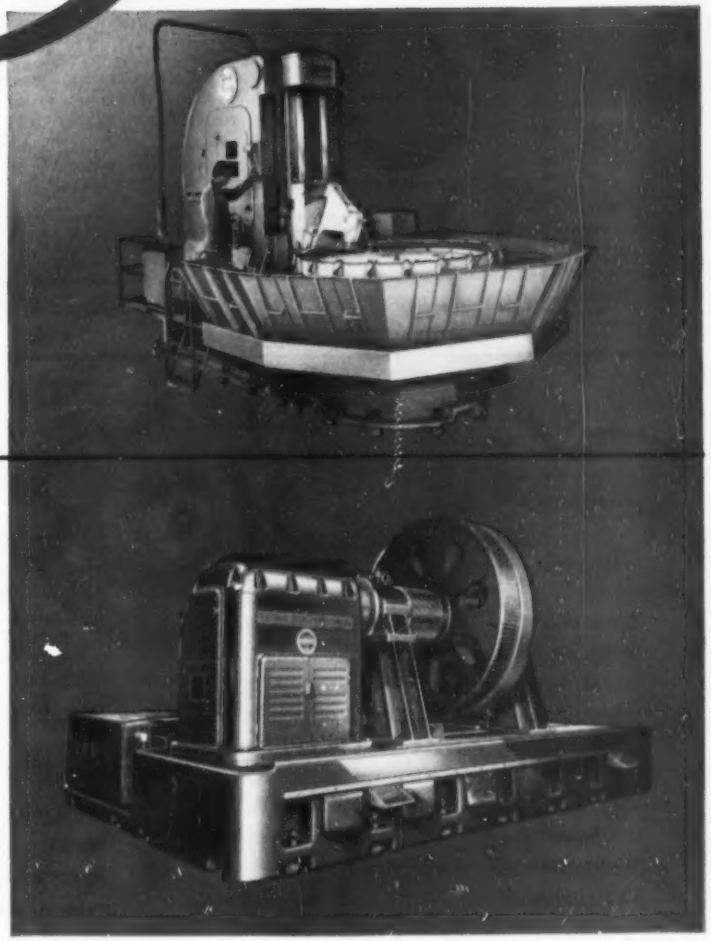
Large marine gear finishing practice moves ahead



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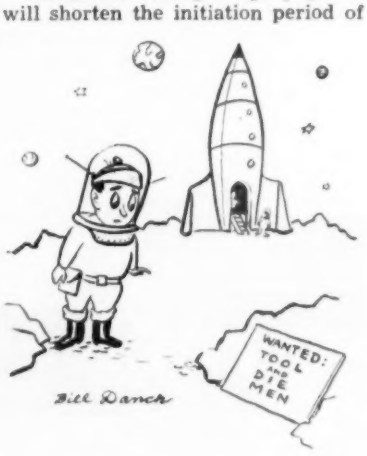
to dietary deficiencies in the things they consume.

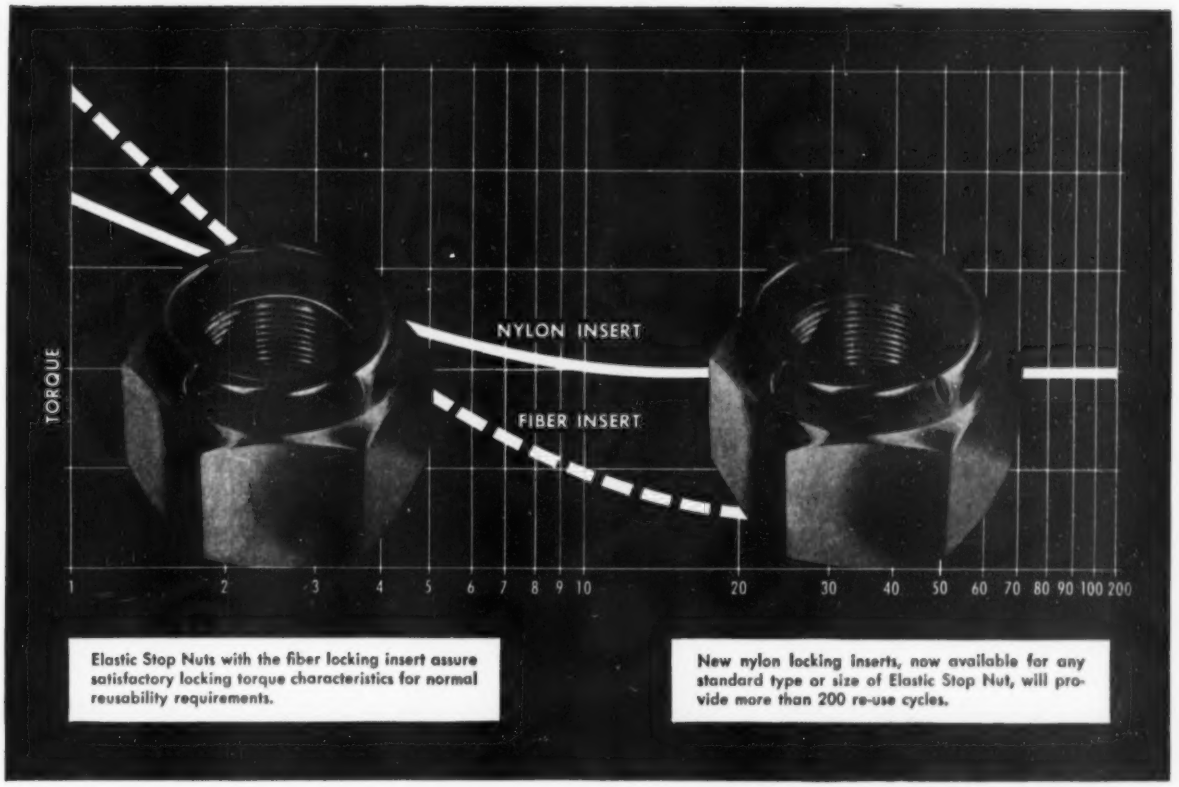
One serious complaint arising from malnutrition is tuberculosis, which is no respecter of persons, and attacks people who seem least likely to have any chance of being afflicted. I have never seen this point stressed sufficiently in plant propaganda, but I think it would prove to be a vital factor in encouraging workers to eat proper meals. In this matter of eating, education along sound lines is what is wanted and experts on diet should be invited to give their views in any propaganda scheme designed to encourage the eating of cooked meals.

In plants which employ a large proportion of females, the need for education in the value of sound diet is greater than is the case where the employees are all male. The incidence of tuberculosis among female workers is too high to be ignored; there is no doubt that their sketchy eating habits have a lot of bearing on the low state of health endured by many of them, particularly those under 30 years of age.

When a firm institutes a cafeteria, their task has only just started. It is not sufficient to open the place and expect the customers to fill every seat. The firm must sell the cafeteria to the customer, just like any outside catering organization would have to. Although the firm may have been actuated by the loftiest motives when instituting a cafeteria service, they will have to combat mistrust, ignorance, obstinacy and indifference. It may take several years of operating the cafeteria before it can be claimed to be a success and the organizers will have to take a long-term view and not give up the scheme in discouragement. The scheme must be looked upon in the manner of a crusade, because that is really what it is.

Clever advertising and propaganda will shorten the initiation period of





How do you measure Reusability?

UP TO FIFTEEN TIMES?

For assemblies that must be locked in place, Elastic Stop Nuts with fiber locking inserts guarantee a permanently secure grip—plus ample reusability to cover most normal maintenance requirements.

For assemblies that must be disassembled and reassembled five, eight, ten, or more times during normal use, fiber insert Elastic Stop Nuts make the ideal self-locking fastener.

When an Elastic Stop Nut is run on a bolt, the Red Elastic Collar hugs the bolt—actually makes a skin-tight fit against the entire contact length of the threads—and this controlled torque firmly resists vibration or shock. When the Elastic Stop Nut is removed from the bolt, the natural resiliency of the Red Elastic Collar is your guarantee of continuing torque when the nut is reapplied.

MORE THAN FIFTEEN TIMES?

Now, for assemblies that require constant adjustment or frequent disassembly for checking and maintenance, ESNA offers all standard types and sizes of Elastic Stop Nuts with the new nylon locking inserts.

Reusable up to 200 times with remarkably constant torque characteristics, these new Elastic Stop Nuts offer the one-piece construction, the shock resistance, and the moisture-seal features that many manufacturers now depend upon in the standard Elastic Stop Nuts.

One of these Elastic Stop Nuts is probably the solution to your most troublesome fastener problem. It will pay you to look into the self-locking performance of Elastic Stop Nuts. For information, write for a new, free booklet. **Elastic Stop Nut Corporation of America,** 2330 Vauxhall Road, Union, New Jersey, Dept. N5-49.

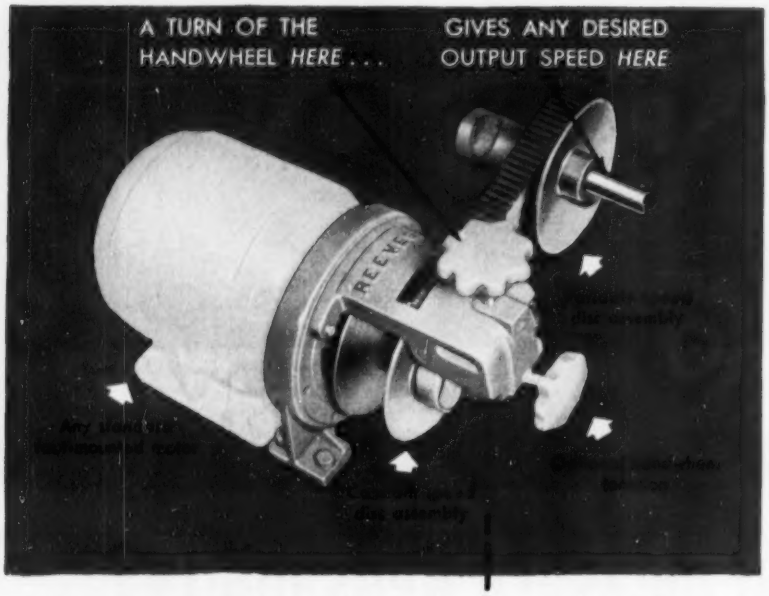
ESNA
TRADE MARK

ELASTIC STOP NUTS

NYLON AND FIBER INSERT TYPES ARE QUALIFIED TO SPEC. AN-N-5

NEW! REEVES
Flexi-Speed Drive

Mounts in any position . . . drives in any direction . . . gives any speed within 8:1 range. *Low Price!*



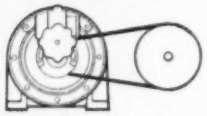
New REEVES Flexi-Speed Drive is the most versatile variable speed drive on the market today. Drives in any direction. Mounts in any position—above, below or beside the driven machine—practically without limitation. Speed control handwheel and driven shaft may be located anywhere around the motor shaft. Six different length belts offer a wide choice of shaft center distances.

For all these reasons, REEVES Flexi-Speed Drive is the easiest, most practical, and economical way of converting any constant speed motor to an infinitely variable speed drive *with 8:1 speed range*. May be used with any standard ball bearing, foot-mounted motor of ½, ¾ or 1 hp. Identical in working principle to the time-tested REEVES Motodrive, the Flexi-Speed Drive consists of constant speed disc assembly, variable speed disc assembly, double-cog belt and versatile shifting mechanism.

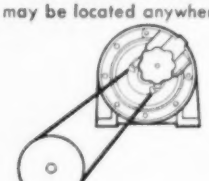
REEVES Flexi-Speed Drive is ideal for driving to standard gear reducers for parallel drive, on worm gear reducer for inexpensive right angle drive. Its versatility assures maximum production with the greatest efficiency and economy in your machines. Write today for complete details. Specify Dept. A90-V532.

REEVES PULLEY COMPANY, COLUMBUS, INDIANA

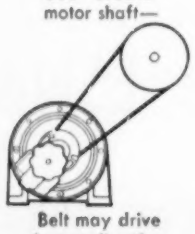
Some of the mounting positions



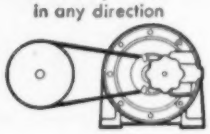
Handwheel control may be located anywhere



360° around motor shaft—



Belt may drive in any direction



REEVES SPEED CONTROL

the cafeteria scheme. Compulsion by rules will only cause irritation and breed opposition.

Clifford T Bower
London, England

•

To ISSUE an order to employees telling them that they have to eat in the cafeteria instead of on the benches in the shop is the pinnacle of executive gall. I've eaten my lunch on the shop bench with the boys for years and years. Why should I have to change now simply because some lame brain gets a bee in his bonnet about the men eating their lunches.

I can't see anything undignified about eating from a lunch box. My old man ate his lunches from a box and lived to be 85 years of age, so the argument that a hot lunch is better for a man is all hogwash.

As for eating in the cafeteria raising the morale—bah! What is more conducive to lowering a man's morale than having to splash around like a sparrow, skin himself of his overalls while he dries himself with one hand, then racing like mad to get a place in line at the eatery which is usually located a couple of blocks away? Frustrating I calls it and all for the sake of one individual who thinks he has something to increase the efficiency of the plant! There should have been something in the Constitution about the inception of radical ideas as being detrimental to the smooth running of government or industry.

Insisting on the employee taking his meals in the company cafeteria is on a par with throwing a cast iron egg beater in the gearbox. Sure as hell there'll be teeth aflyin' in short order. Let well enough alone and let the men enjoy themselves in the good, old fashioned way—on the shop bench where they can express themselves in the language they're used to.

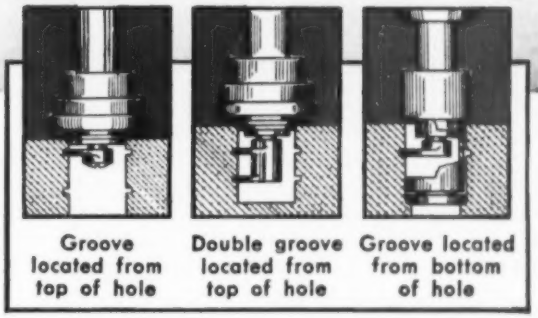
Jack Everett
San Francisco, Calif

"You win, Hap, here's your five."

Waldes Truarc Internal Grooving Tool

for precision cutting of internal grooves in bores and housings

FAST! ECONOMICAL! NEEDS NO SKILLED LABOR!



Groove located from top of hole | Double groove located from top of hole | Groove located from bottom of hole

Internal groove-cutting becomes the simplest of operations with Waldes Truarc Internal Grooving Tool. Easy to adjust—easy to operate...readily adaptable to individual requirements.

Designed for use in any hand drill or automatic drill press and screw machine... assures a concentric recess without injury to metal. Operates by fingertip pressure—especially suitable for unskilled operators.

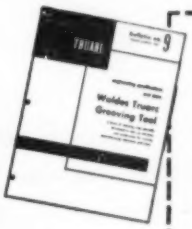
The Waldes Truarc Grooving Tool when used in an electric or pneumatic hand drill, can be taken to the job eliminating disassembly and excessive handling...resulting in all-around savings in time and costs!

Write now for new 12-page Catalog giving mechanical details, cutting sizes...extra features...full information

WALDES TRUARC

REG. U. S. PAT. OFF.

GROOVING TOOL



WALDES KOHINOOR, INC., 47-16 Austel Place, Long Island City 1, N.Y.
Waldes Truarc Grooving Tool
Manufactured under U. S. Pat. 2,411.426

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Please send me your new 12-page Catalog on Waldes Truarc Internal Grooving Tool.

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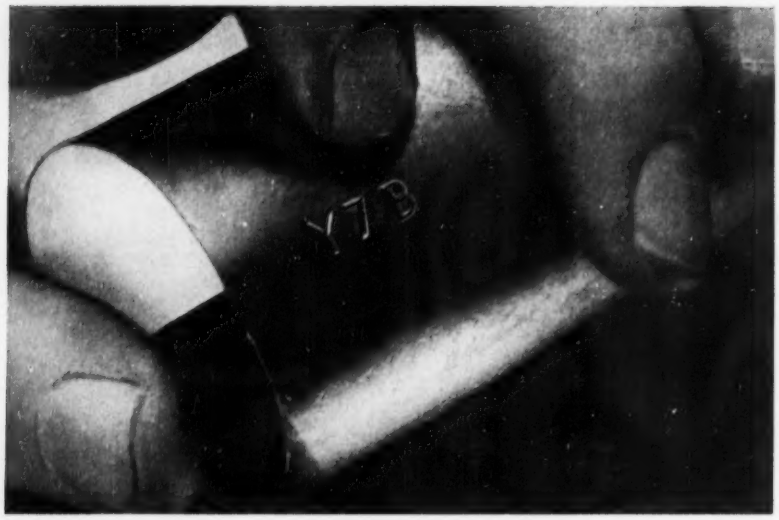

Sure of your Alloys?

Call Ryerson and Be Sure, 8 Ways!

Like the bar in this picture, *every bar* of Ryerson alloy steel has its mark—a symbol that identifies the particular heat from which the bar was rolled. And on all but the smallest bars this heat symbol is unmistakably stamped into the steel itself.

The result: Positive heat identification, just one of eight ways that we protect you against the many slips that could occur before the alloy steel you order reaches you.

Your protection begins with careful selection of the heats to be carried in our stock. Next, analysis is verified and all Ryerson alloys are spark tested to guard against mixed steels. Then the bars are color marked and stamped to identify type and heat.

Meanwhile, we test a sample of every heat for hardenability and interpret the test results for you. So, finally, when you call Ryerson for alloys, you can be SURE—sure of the steel you get and sure of what it will do.

Tested steel—racked separately by heats—is taken from stock; prepared to your specification; given a final inspection and shipped to you quickly. And with your steel (as-rolled or annealed), you receive complete test data to verify quality and guide your heat treatment.

This 8-point quality control is yours, at no extra cost, from Ryerson—and only from Ryerson. Just call your nearby Ryerson plant.

PRINCIPAL PRODUCTS IN STOCK: CARBON, ALLOY & STAINLESS STEEL—BARS, STRUCTURALS, PLATES, SHEETS, TUBING, ETC.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA
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Tangents by Tange

TOUGH OR SOFT?

Cameron Hawley used to be director of advertising and promotion for Armstrong Cork Company, a good job with a reputable and progressive outfit and in a delightful town. Instead of being content, he cut loose with the itch that is hardest to scratch—the itch to write a novel. He has written it, "Executive Suite", published by Houghton-Mifflin a few months back. In hard covers, it's now on the best-seller list, and as a paper-backed 35-center published at the same time by Ballantine Books, it has topped a half million. Obviously, Mr Hawley's gamble has paid off.

But that, admirable as it is, isn't my reason for mentioning him or his book here. It's because he dealt with a series of key men in business and made them all human—and all different. These are no cold "types", either benevolent and considerate proprietors or money-grabbing, hard-eyed moguls, as business men are so often pictured, depending on the author's politics. These are all human beings, with the usual human strengths and failings. You'll identify characteristics of the executives you know among these executives, but you probably won't find one with all the characteristics of any executive you know. The characterizations are too well drawn for that.

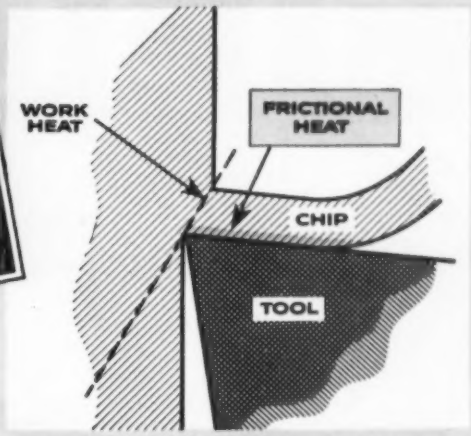
Thus Mr Hawley, dealing with the 24 hours of five vice-presidents after the dictatorial president dies suddenly without naming his successor, has been hailed as the new interpreter of the American business man. His book makes absorbing reading.

Beyond that, Mr Hawley's own

NEW! A coolant that reduces frictional heat!

JOHNSON'S
#130
WAX-COOL

Water-type WAX coolant



Because of wax's greater lubricity, Wax-Cool effectively attacks *frictional heat* which develops at the tool-chip interface. Wax-Cool also has the heat carry-off properties of ordinary coolants—to disperse *work heat* generated in the shearing zone.

Johnson's Wax-Cool **is the first water-soluble coolant to introduce *real lubrication* between tool and chip, thereby attacking frictional heat at its source.**

Developed by the makers of Johnson's Wax and thoroughly tested in leading production shops, Wax-Cool not only disperses *work heat* generated at the point of shearing . . . it minimizes the more troublesome *frictional heat* generated at the tool-chip interface. (It is an accepted fact that, as cutting speeds rise, friction between tool and chip becomes by far the principal source of heat.)

Because of wax's polar attraction for metals, Wax-Cool *stays with* tools and works even under high heat and pressure, preventing chip weld and reducing frictional heat far more effectively than water-soluble coolants have ever been able to do.

Wax-Cool's ability to reduce frictional heat means: Far greater tool life . . . improved finish . . . increased production.

WAX-CUT...new wax-type cutting oil

Johnson's Wax-Cut brings all the lubricating and heat-dispersing benefits of special waxes to automatic screw machines, gear cutting machines, and other equipment calling for cutting *oils*.

A TEST IS YOUR BEST PROOF!

Hundreds of production shops across the country are already benefiting from the improved lubricating qualities of these specially blended waxes. A test of Johnson's Wax-Cool or Wax-Cut in your own machines will show you standards of performance and economy you never believed possible.

For all the facts, get in touch with your local Johnson distributor, or write now to:

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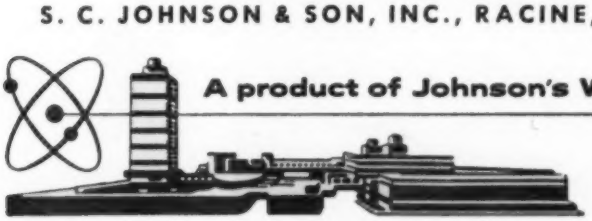


A product of Johnson's Wax Research

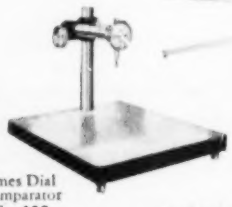
AMES

No. 2
Dial Comparator

This is smallest in the Ames' line of high quality dial comparators and it is ideal for desk or bench use in the fine inspection of small precision parts. It is light in weight, but its broad base makes it very stable. The capacity approximates that of the regularly supplied Ames No. 202 Dial Indicator which has a dial numbered 0-100, graduated in .001" and with a .250" range. Should your job requirements differ, you can have the No. 2 with any Ames "Hundred Series" Dial Indicator. Send for Ames Catalog No. 58 covering the entire line of Ames Top Quality measuring instruments or, better still, send complete details of your Quality Control problem. Ames will suggest a solution – no obligation, of course.

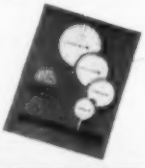
Ames Long Range Dial Indicator No. 2822

Ames Dial Micrometer No. 516



Ames Dial Comparator No. 130

Ames Caliper Gauge No. 12B



Send today for your free copy of Catalog No. 58

Representatives in principal cities. B. C. AMES CO. *26 Ames Street Waltham 54, Mass.*

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

ideas are interesting. In the process of his writing, he analyzed many business men he'd known, and comes up with the observation that most of them are very intelligent, very human, very genteel, and very considerate. He also has come to believe that anything from a committee to a company must be run by one man to be successful. This gives him pause, because he has come to the conclusion that many executives are *too* human, *too* considerate, and much *too* genteel. He's afraid that current public-relations efforts to make executive lovable are leading to a softening that is not good. He is not particularly impressed by employee affection. He says flatly, "Remember that love is a passing thing, but respect endures." In other words, he believes in the two-fisted executive who can be tough when necessary, who makes himself respected. He can be loved, too, but that is a fortunate addition, not an essential, and certainly is not worth attainment if it jeopardizes the long-term growth of the company.

Mr Hawley has a point, because the executive's first job is to protect the company, and by so doing to protect the jobs of its workers and the money of its stockholders. At times he must be *very* tough to do it.

Anyway, read "Executive Suite". You'll find it fascinating—and familiar.

ANNUAL REPORT

One recent trend in humanizing business has been the attempt to make annual reports understandable, particularly to employees. We've seen all sorts, normal size, tabloid, miniature; simplified, glorified, cartooned, 4-color-painted, and what not.

"I don't want him to grow up not knowing what his father looks like; always working overtime!"

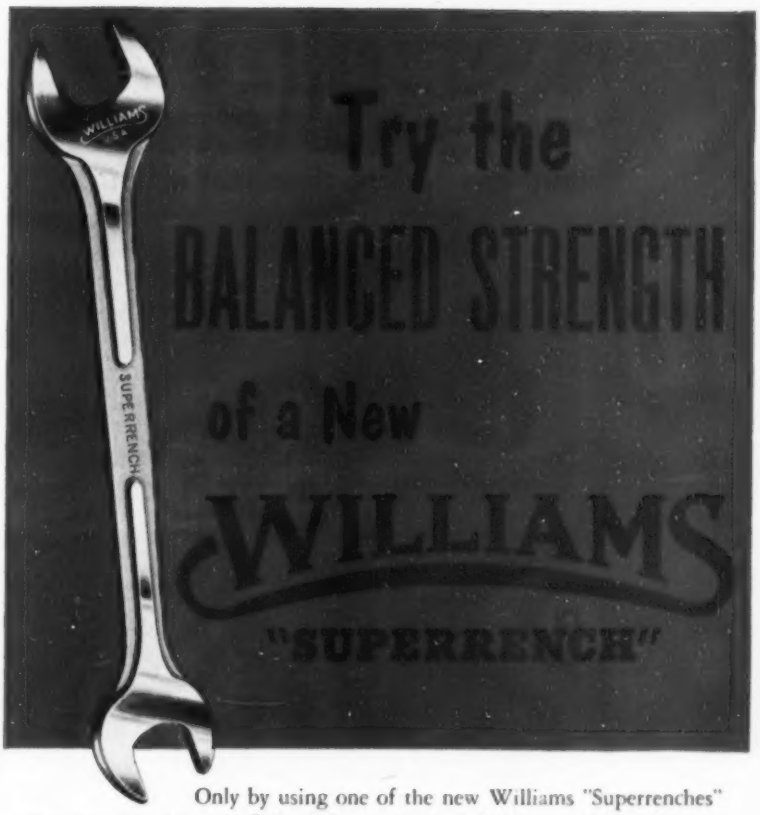
But none is so impressive, or so convincing, as "The Record of 1952", an annual report for employees published by Westinghouse as Vol 8, No. 9, of *The Westinghouse News*.

It's check-book size and shape, and after the usual message to employees, each page is a check of familiar pink. Total 1952 sales of $1,463,371,812 are shown as a deposit, then each spread is a check to some group, with the stub filled out to show the balance and the facing page explaining the check. Check #1, for example, is made out to "Suppliers of Materials and Services", and is for $705,984,968. The facing page explains that that check represents a million orders to 10,000 suppliers for more than 100,000 different items, even mentions $144,000 paid out for 8,346 employee suggestions, most of which cut the cost of materials and services.

There are 11 checks altogether, #2 for interest on debt, #3 for taxes, #4 for replacement, #5 for wages and salaries, #6 for vacations with pay, #7 for holidays with pay, #8 for insurance and pensions, #9 for social security and unemployment compensation, #10 for stockholder's dividends, and #11 for a "stronger Westinghouse", leaving a balance of zero. Employee sharing is noted in red on checks 5 to 10. And the last spread forecasts 1953.

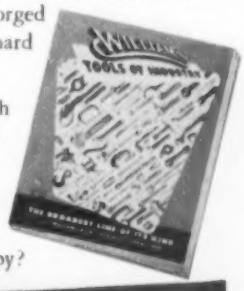
It's a magnificent job—and one that's understandable, even to the worker who has only a special checking account. (Maybe, for that reason, check #11 should not have been drawn—leaving that balance in the "bank." Nobody likes a balance of zero.) Better get a copy and see if the ideas aren't adaptable to telling *your* story to *your* people.

"Remember that blueprint you refused to discuss with me? Well, there's your 1,000 ¾ bushings with a 1-in. bore!"



Only by using one of the new Williams "Superrenches" can you get the true feel of its exceptional balance and strength, so important on jobs ranging from delicate to the most severe.

In designing these wrenches for greatest possible working efficiency, Williams redistributed the weight... made the heads slimmer and the handles longer and narrower. You'll find them more serviceable where clearances are limited. And, because they are drop-forged from carefully selected alloy steel... they'll take hard service longer.



Williams NEW streamlined "Superrenches", with double head, open ends are available in a full range of 15° angle opening combinations. Order a supply from your Williams Distributor.

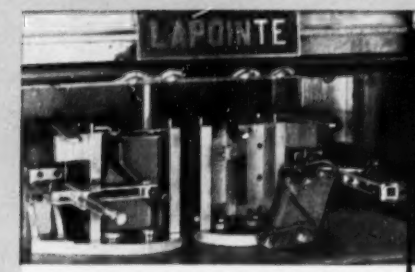
The full line of Williams Tools is illustrated and described in Catalog 201. May we send you a copy?

Be Wise... Buy
WILLIAMS
INDUSTRIAL TOOLS

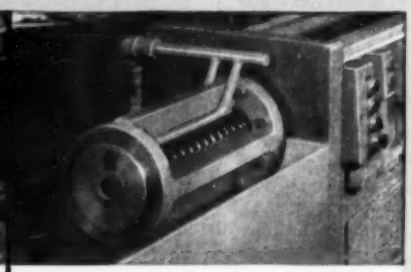
Through your Distributor

J. H. WILLIAMS & CO. • 493 Vulcan Street • Buffalo 7, N. Y.

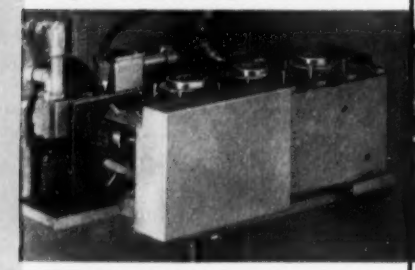
when designing
BROACHING FIXTURES
you need more than just a "hunch"!



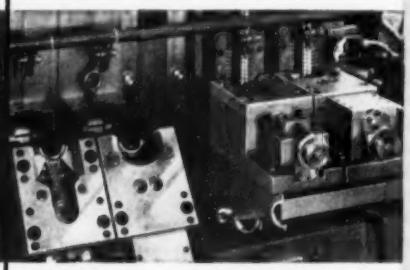
Close tolerance and exact spacing of holes in tank track shoes are made possible by this Lapointe V-8 Broaching Machine fixture.



Broach die-holding fixture, specially designed for easy coolant access and disposal of chips.

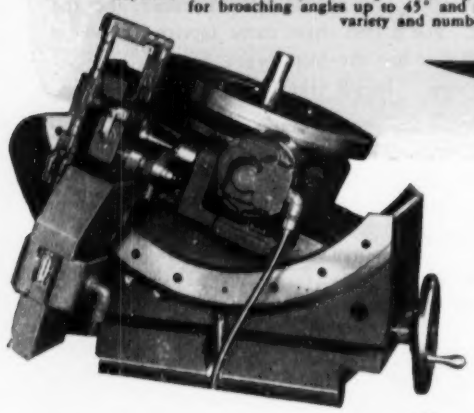


Operated unattended because of several built-in safety features, the Lapointe VU-3 Broaching Machine can broach helical splines in automotive gears through the use of this conveyor fixture.



The "Tip-Down" Fixture, exclusive with Lapointe, tips down to a position for easy loading, minimizes operator fatigue. Shown here on 15-ton Lapointe DRV Machine, for broaching connecting rods and caps.

Lapointe Universal Compound Angle Indexing Fixture, for broaching angles up to 45° and maximum variety and number of slots.



Varied fixture requirements of the different types of broaching machines — single ram and double ram, vertical and horizontal — call for engineering skill in fixture design that can only be gained through long experience. Lapointe engineers, with their 50 years of background, can refer to countless designs involving fixture principles that show remarkable ingenuity.

Whether, therefore, your need is for a broaching fixture that is simple or complex, manual or automatic, come to "fixture headquarters" . . . come to **LAPOINTE.**

Literature on broaching machine fixtures can be obtained by addressing Department 2

THE LAPOINTE MACHINE TOOL COMPANY
HUDSON, MASSACHUSETTS • U. S. A.
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THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

Lubrication Program Cuts Maintenance Costs

"It has been said that the keystone of the maintenance program of any industrial plant is lubrication of the moving machinery. No matter how well that machinery has been designed, constructed and installed, early failure, excessive downtime and high maintenance cost will inevitably result if adequate lubrication is not provided."

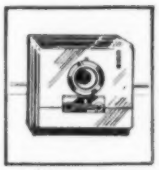
Speaking at the Plant Maintenance Conference in Cleveland Jan 20, J R Sautter, assistant works engineer, E I Du Pont de Nemours & Co, then went on to describe a lubrication program that had resulted in considerable savings to the Chambers Works. "About four years ago, a lubrication engineer was assigned on a full-time basis to the plant. This individual was made responsible for:

1. Development of an integrated lubrication program for the Plant. This consisted of three phases: (a) preparation of a *Lubrication Data Card* for each piece of equipment; (b) installation of lubrication accessories such as grease fittings, constant-level oilers, force-feed lubricators, portable lubricant dispensing stations, etc; (c) development of a system for scheduling the activities of lubrication mechanics and the preparation of those schedules.
2. Maintenance of liaison with the lubricant consultant of the central engineering department of the company.
3. Promotion of the use of du Pont code lubricants.
4. Trouble shooting.
5. Collaboration in the design work of the engineering department.
6. Training of lubrication mechanics and repair men.
7. Preparation of lubrication cost reports.

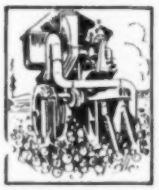
Savings have been realized from this lubrication engineering program from intangibles such as: (1)

"Rough day?"

Ideal for certain applications

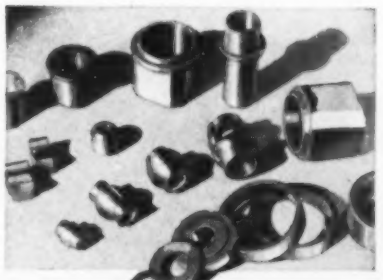


Washers



Cotton Pickers

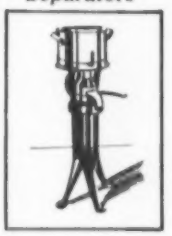
Business Machines

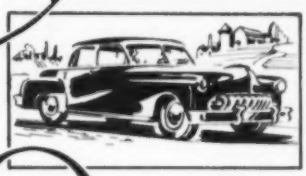


JOHNSON Ledaloyl SELF LUBRICATING **BEARINGS and parts**

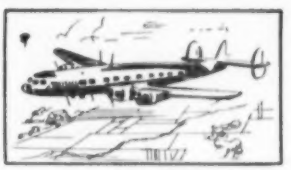
Electric Motors

Cream Separators





Automobiles



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reduced injury exposure, (2) reduced outage for repairs, (3) use of the right lubricant for the service, (4) maintenance of correct oil levels in gear reducers, bearings, etc., (5) reduced contamination of lubrications.

"Conservative estimates indicate that the plant is realizing substantial yearly savings from this program; from trouble shooting, $10,000, from reduced maintenance, $30,000, and from improved job methods, $20,000."

•

How to Avoid Flicker in Fluorescent Lighting

How to cure two problems commonly encountered with fluorescent lights was explained at the Jan 19 meeting of the Plant Maintenance Conference, held concurrently with the Fourth Plant Maintenance Show in Cleveland. R G Edsall, works electrical engineer, Westinghouse Electric Corporation, said, "Our greatest trouble, and probably yours, has been flickering. This trouble is twofold: first, the disturbing effect on the employes, and, second, the hazard of burning out the ballast from the excessive starting current. This has been eliminated by no-blink starters that automatically cut off the offending lamp if the current is excessive because of flickering lamps or lamps that are near the limit of their life.

"A flickering lamp is readily noticeable and we have found from actual experience that one or more tubes extinguished are not noticeable. In fact, we are planning to set up a program of disregarding most calls placed on the Maintenance Department for replacing burned-out lamps and only replacing them on cleaning schedules. Just how well this plan will work out can only be governed by future experience.

"The second trouble is plastic louvers. When these units were first installed, they were removed from the shipping cartons and installed with a minimum of handling. All went well until the first cleaning schedule when they were cleaned with soap and water and dried with a cloth. Two weeks after, they were as dirty as if they had been in service for four months. The reason—drying loaded the louvers with static electricity which actually sucked dirt to the surface. The cure, wash them in a solution containing a soapless powder (we have been using Dreft), rinse in a clear-water bath and hang them while still wet."

NEW BOOKS

AMERICAN STANDARDS—*Published by the American Society of Mechanical Engineers, 29 West 39th St, New York 18, NY.*

GRAPHICAL SYMBOLS FOR PIPE FITTINGS, VALVES AND PIPING—American Standard ASA 232. 2.3-1949. Price, 50 cents. Seventy standard symbols are provided for the use of architects and engineers to avoid confusion in interpreting requirements.

GRAPHICAL SYMBOLS FOR WELDING. American Standard ASA 22. 2.1—1949. Price, 50 cents. The symbols provided were developed by the American Welding Society, and are the same as in earlier publications, but the method of using them has been improved and clarified.

•

MACHINE SHOP TOOLING *(1953 Edition)—By Charles C Williams. 344 pages; 4½ × 6½ in. Published by the Wilco Press, 3326 N Bailey St, Philadelphia 29, Pa. Price $3.*

This reference book is written for machine operators. It presupposes that they know how to run their machines and set them up. Therefore, the book concentrates upon supplying reference data on materials, tool angles, feeds and speeds, coolants. Specific recommendations are given for drills, taps, milling cutters, grinding wheels, chasers, turning tools, etc, for all materials from aluminum to zinc. More than 50 manufacturers supplied information for the book.

•

BEHIND THE SCENES OF BUSINESS—*By Roy A Foulke. Published by Dun & Bradstreet, Inc, 99 Church St, New York 8, N Y. 194 pages. Free upon direct request to Dun & Bradstreet.*

First published in 1935, this volume has been completely revised and rewritten. It is a guidepost to industrial firms in readjusting from "pressure economy" to a competitive economy. By "pressure economy" the author refers to a situation that has existed for the last 12 years, when almost anything that could be produced was easy to sell. Today, however, trends point to a competitive period based on sound values and pricing. To meet the demands of free competition, the author out-

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lines sound policies that must be followed by management to avoid hazards to business progress. Concluding the volume are tables covering important median financial ratios for 70 lines of business during the period 1947-1951.

•

HOW TO CONTROL PRODUCTION COSTS —*By Phil Carroll, consulting industrial engineer. Published by The McGraw-Hill Book Co, 330 W. 42nd St, New York 36, N. Y. 272 pages. Price $5.*

Discussing an extremely important phase of management, Phil Carroll does an excellent job of explaining the fallacies in many commonly used costing systems and goes on to develop a method for obtaining accurate cost figures. Bringing in many examples from his broad experience in industry. Carroll describes costing practices in language that can be readily understood and in easy, interesting reading. The author covers forecasting, control methods, overhead distribution, the rotation of tolerances to cost, incentives, reports to management, and all other major phases of the control of production costs. This is a book that every shop executive, methods engineer, and cost accountant should read.

•

STANDARDS—ENGINEERING TOOLS FOR INDUSTRY —*Published by the American Standards Association, 70 East 45 St, New York 17, NY. 64 pages. Price $2.00*

Proceedings of the Third National Standardization Conference held in conjunction with the Centennial of Engineering in Chicago last Septem-

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ber have just been published. Combined with the proceedings are the principal addresses at the Association's 34th Annual Meeting Award Luncheon held Nov 25 in New York. The booklet includes papers presented by William L Batt, formerly president of SKF Industries, Inc, and recently Minister of Economic Affairs to the United Kingdom; Roger E Gay, president of the Bristol Brass Corp; Williard T Chevalier, exec vice-pres, McGraw-Hill Publishing Co; and Joseph W Barker, president, the Research Corp.

Standardization is discussed by men from trade associations and such companies as E I duPont de Nemours & Co, Westinghouse Electric, Detroit Edison, Union Oil Co, Union Carbide & Carbon Corp, and Taylor Forge & Pipe Works.

The papers feature standardization experience and practices in industrial construction and home building, chemicals, safety, purchasing, photography, welding and in the international field.

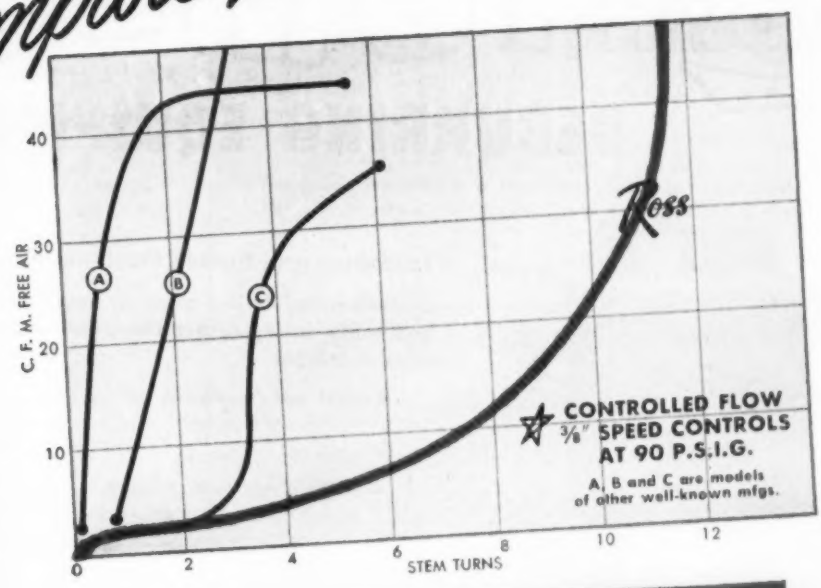
•

TASCHENBUCH FUR BETRIEBSINGENIEURE, HUTTE (POCKETBOOK FOR PRODUCTION ENGINEERS, HUTTE ACADEMIC ASS'N (2ND SECTION, 4TH EDITION)—*Published by W Ernst & Son, Berlin-Wilmersdorf, Hohenzollerndamm 169, Germany. 480 pages, 5¾x8¼. Price 33.50 German Marks.*

This is one of the well-known series of Hutte pocketbooks. It is an excellent source of information for superintendents and foremen of manufacturing plants, and covers, everything from the layout table to the most complicated machine tools. The various sections were written by more than 50 specialists.

Subjects include: layout; workholding; toolholding; measuring devices; threads and thread measurement; measuring spur gears; balancing; statistical quality control; selection and accuracy of machine tools: electrical drives and controls; power hand tools; molding machines, including die casting; machines for plastic deformation, including hammers, presses, and cold-roling mills. Sheet-metal machines; joining machines, including welding, brazing, soldering, cutting, and riveting; thread rolling; machine tool production lines; planers, shapers, and slotters; lathes; drillpresses and boring mills; milling machines broaches; grinders power saw and filing machines; machines for finishing threads and gears; special machines

Compare



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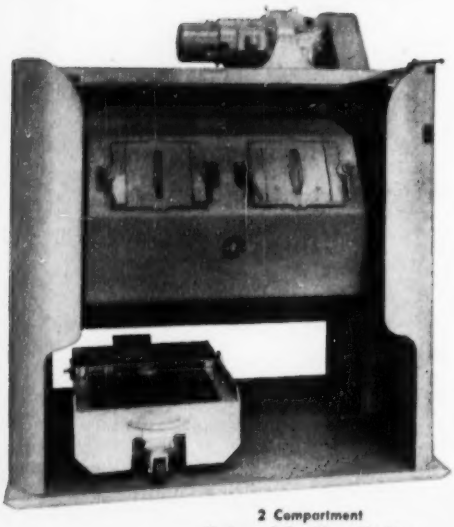

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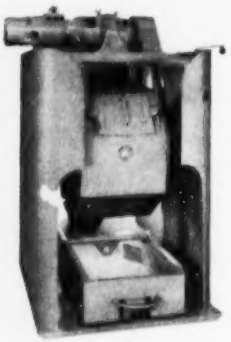

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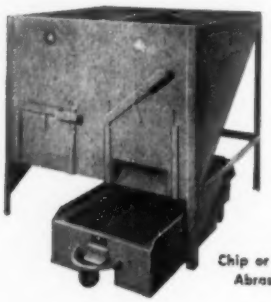
Horizontal Tumbling Machine

Mechanical Separating Table
Hoist Pan Type

Separating Table
Hand Type

Separator — Motor Drive
with Hopper



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for crankshafts and railroad wheels; woodworking machines, including veneer machines and plastic forming of wood; electric hand tools for woodworking; plastics machines; and tableting machines are also included. At the end of each section is a bibliography, referring almost entirely to German literature.

From the standpoint of West German engineers, there can be nothing but praise for this immensely useful reference book. For the US, of course, the language is an obstacle. However, almost all the more than 1000 illustrations are self explanatory. Many references are made to Section 1, in which fundamental processes are described and explained. Consequently, some parts of this volume are not self evident, but require knowledge of Section 1. Many references are made to DIN (Deutsche Industrie Normen), which standards are not readily available in the US.

In many of our larger shops there are German-speaking research engineers who can translate interesting sections to shop foremen. And teachers in apprentice courses can improve their teaching by a study of this book. At present, many teach too much arithmetic and not enough shop practice.

Reviewed by W Trinks

•

MECHANICS OF MATERIALS—*By Seibert Fairman and Chester S Cutshall, both of Purdue University. Published by John Wiley & Sons, Inc, 440 Fifth Ave, New York 16, N Y. 420 pages. Price $5.75.*

This is a fairly standard approach to engineering mechanics, designed for classroom use in an engineering college, and aimed at the basic fundamentals, leaving advanced work for later courses. It includes discussions on stress and strain (tension, compression, shear, elasticity, loading), mechanical properties of materials, bending, deflection, and impact. Illustrations are line drawings, and are uniformly clear. A large number of problems on the subject matter are included with answers for checking.

The authors have stressed the area-moment method for beam deflection, columns, and combined stresses.

Like most standard texts, the book sticks to standard concepts and follows a regular and logical build-up in the subject, which is actually strength of materials. This text is not the least bit flashy, but seems entirely adequate.

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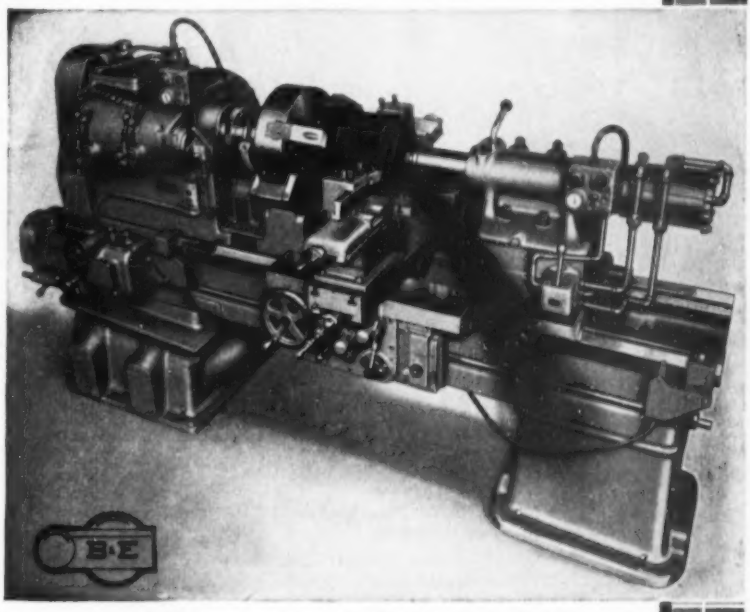

WORK:

Double tapering of graphite nipples.

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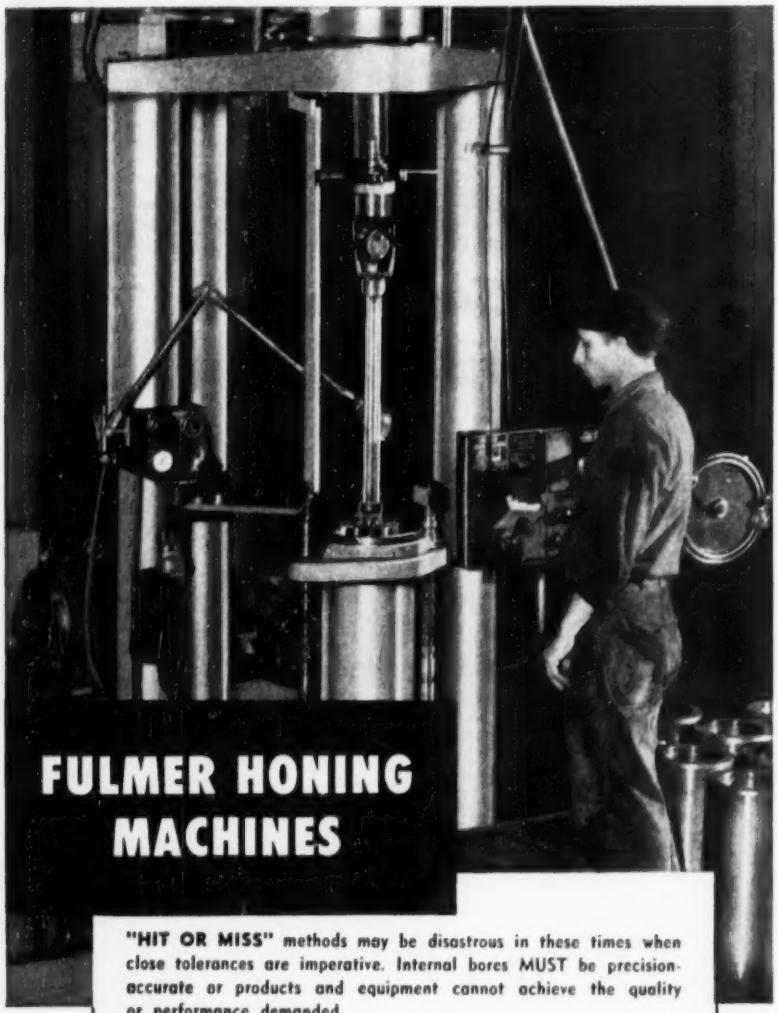

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NAMES in the NEWS

•

E G Moffat succeeds **C R Harmon,** resigned, as manager, Carbide Sales Div, Firth Sterling, Inc. Other appointments announced by Firth Sterling are: **J Martin Stokes,** assistant general sales manager-administration; **Fred Lord,** chief engineer, Mining Sales Div; and **John P Sweeney** and **Munro J Mann** as manager and assistant manager, respectively, of the company's Detroit branch.

J P Coughlin is the new manager of Westinghouse Electric Corp's Arc Welding Dept. He was formerly manager of field sales for the Welding Dept.

William C Ridge has been appointed works manager in charge of John A Roebling's Sons Corp's Trenton and Roebling, N J, plants.

Russell L Gergen has been appointed sales manager of Pipe Machinery Co's Gage Div. He was formerly the company's chief engineer.

Dan Stearns, for the last year manager of Clark Equipment Co's North Central Region, has been named manager of the company's new Midwestern Region. He will headquarter at 310 S Michigan, Chicago.

E F Mitchell has been appointed Detroit district manager for Simonds Abrasive Co.

Joseph E Berman is the new president and board chairman of Industrial Metal Protectives, Inc, Dayton, Ohio. Other new officers are **John R Fisher, Jr,** vice president in charge of engineering; **Franklin O Blechman,** secretary; and **Nancy L Sheets,** assistant secretary and treasurer.

Roy O Johnson has been named metallurgist and **Charles W Eastman** industrial engineer for Hydraulic Press Mfg Co, Mt Gilead, Ohio.

L G Porter, treasurer of Borg-Warner Corp, Chicago, has been named administrative vice president and treasurer. Also appointed vice presidents are general counsel **Robert W Murphy** and **R S Ingersoll,** president of B-W's Ingersoll Products Div.

Thomas A Downie has been appointed northern Pennsylvania sales engineer for Wm K Stamets Co, Pittsburgh machine tool firm.

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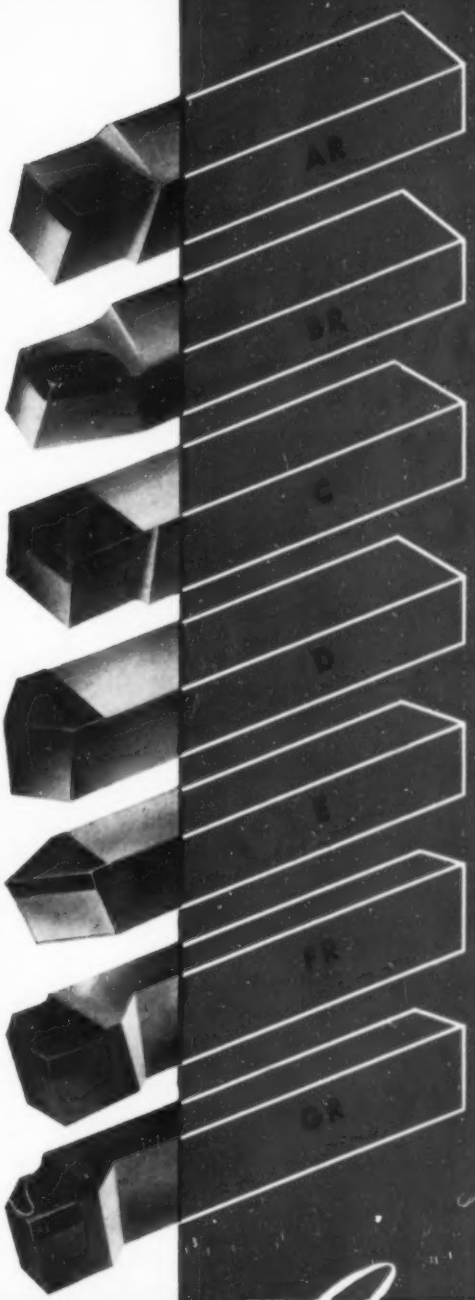

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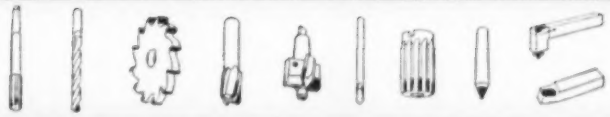

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Tachometer shows exact
spindle speed . . .

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Carl Snyder, formerly with Convair's San Diego plant, has been named superintendent of Magna Mill Products, South Gate, Calif.

P N Jansen, production consultant for Boeing Airplane Co, has been appointed special assistant to senior vice-president Wellwood E Beal.

H R Lobdell has been elected vice president in charge of production and field service for Machinery Mfg Co, Inc, Los Angeles. Mr Lobdell was formerly with Emhart Mfg Co's Standard-Knapp Division for 10 years.

L A Dixon, executive vice president of Rockwell Mfg Co, has had his responsibilities extended to include jurisdiction over Rockwell's power Tool Operation, which includes Rockwell Tools, Inc, Delta Power Tool Div, and DeLuxe Saw & Tool Co.

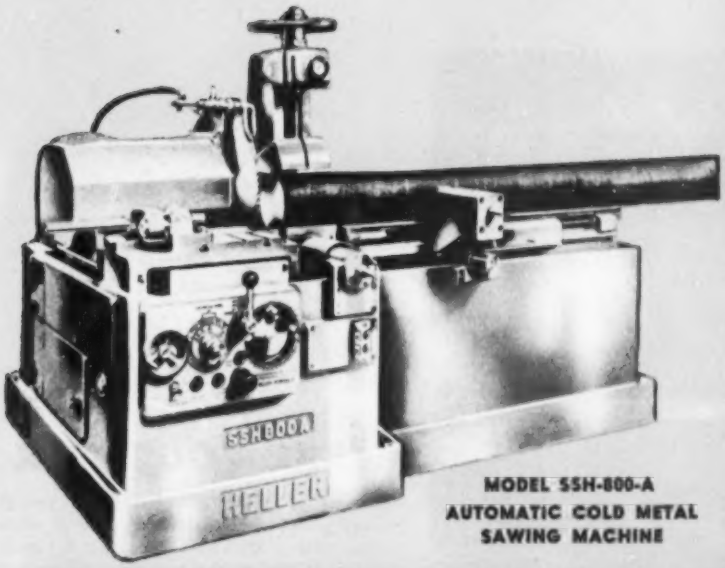
C H Kimmel has been appointed vice president and general manager of Ohio Crankshaft Co, Cleveland. Mr Kimmel, who has been with Ohio Crankshaft since 1940, was formerly with Studebaker Corp and Packard Motor Car Co.

Joseph J DeWindt and **G C Vogel** have been named assistant works manager and general superintendent, respectively, of Allis-Chalmers Mfg Co's Norwood, Ohio, works. Mr DeWindt was formerly general superintendent. Mr Vogel was superintendent of the company's electrical departments.

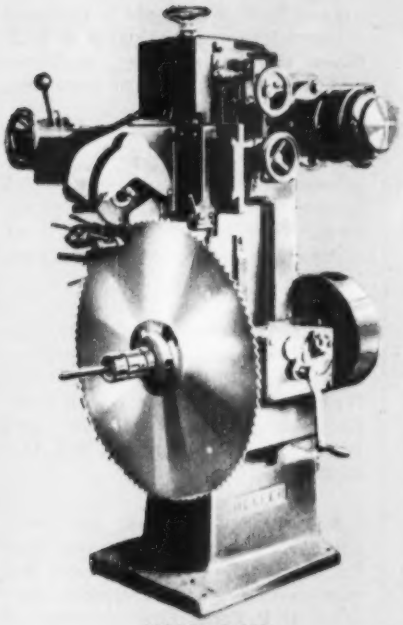
Frank Purnell, chairman of the board of Youngstown Sheet & Tube Co, will retire late in April after 51 years in the steel industry. He will continue to serve as a member of the board and company executive committee.

William H Roberts has been elected vice president and secretary of Detroit Stamping Co. He succeeds **John Beck** and **H G Roberts,** who have held these respective offices in semi-active capacities in recent years.

George I Clover has been appointed manager of manufacturing for General Electric Co's Motor and Generator Div. Also named to new division posts are: **Charles J Koch,** manager of engineering; and **Dwight E Moorhead,** manager of the San Jose, Calif, plant.



MODEL SSH-800-A
AUTOMATIC COLD METAL
SAWING MACHINE

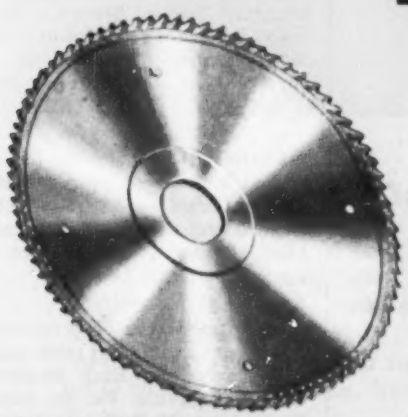


MODEL B-650
AUTOMATIC SAW SHARPENING
MACHINE

Cutting Costs and
Increasing Efficiency with

HELLER

COLD SAWING MACHINES
BLADE SHARPENING MACHINES
AND SAW BLADES



HELLER GIVES YOU COMPLETE SERVICE WITH
EXACTLY CORRECT BLADES.

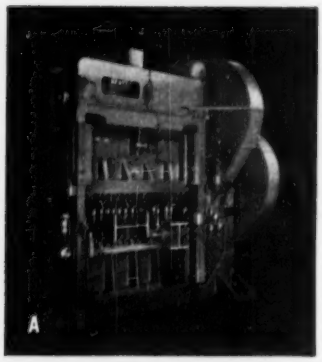
Heller High Efficiency Cold Metal Sawing Machines are built in both manual and fully automatic types in machine sizes ranging from 3" bar capacity up to 48" billet capacity and blade sizes from 12" to 120" diameter. They are full hydraulic with completely centralized operating control. Illustration shows our SSH-800-A full automatic with bar capacity to 10" round stock.

The Model B-650 machine shown represents a new construction in arrangement and operating features. Using change gears and built-in dividing head, it insures a true tooth pitch and form and eliminates the use of a variety of master index plates for varying diameters and pitches of saw blades. Machine is rigidly constructed to secure extremely high grinding capacity and performance and produces a true and correct cutting tooth shape. Machines built in five sizes for 2½" to 120" diameter saw blades.

Importing Heller Machines Since 1926

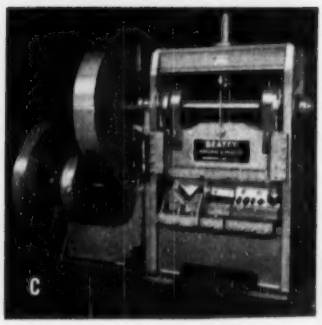
HELLER MACHINE COMPANY, 114 Liberty St., New York 6, N. Y.

KNEE AND PLANER TYPE MILLING MACHINES • RADIAL AND COLUMN DRILLING MACHINES • TRANSFER MACHINES • SPECIAL MACHINES

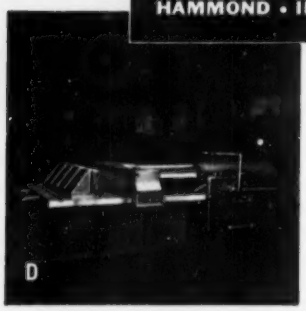


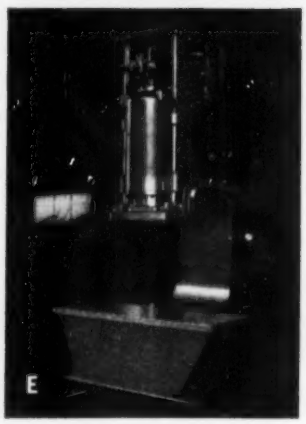
TAKE YOUR PICK

When playing the "ole shell game" you always guess wrong. That's not true when you pick a BEATTY machine for your plant. If one of the machines illustrated isn't the answer to your production problem, BEATTY engineers will design and build one to fit your specific needs. Broad experience in varied fields of metal working industries enables us to build machines that satisfy the demands of any fabricator.



BEATTY
MACHINE & MFG. CO.
HAMMOND • INDIANA





A. BEATTY Guillotine Beam Punch. Punches webs and flanges in "I" beams from 6 to 30 inches.

B. BEATTY Spacing Table handles web and flange punching without roll adjustment.

C. BEATTY Guillotine Bar Shear for "short order" shearing of bars, rounds, angles and squares.

D. BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging and bending.

E. BEATTY Gap Type Press for forming, bending, flanging, pressing. Capacity 250 tons.

Henry S Elder, new executive vice president, heads a roster of new promotions announced by the board of Titeflex, Inc; **George K Licht** to vice president in charge of production at Titeflex's two Newark, N J, plants; **John J Phillips** to vice president in charge of sales and engineering.

W A Thomas has been promoted to chief engineer for Electric Products Co, Cleveland. Others named to new positions: **E D Smith** to consulting engineer; **J J Unger** to manager of electrical engineering; **J R Williams** to manufacturing manager; and **R H Worby** to chief industrial engineer.

Richard E Reiter has resigned as general manager and secretary of Leading Engine Co, Farmington, Mich, to become superintendent of Willys-Overland Motors' Landing Gear Division.

James W Tweedy, Jr, has been appointed vice president and general manager of Redmond Co, Inc, Owosso, Mich, and will head company operations at Owosso and Ithaca, Mich; Jacksonville, Ark; and St Thomas, Ont, Canada.

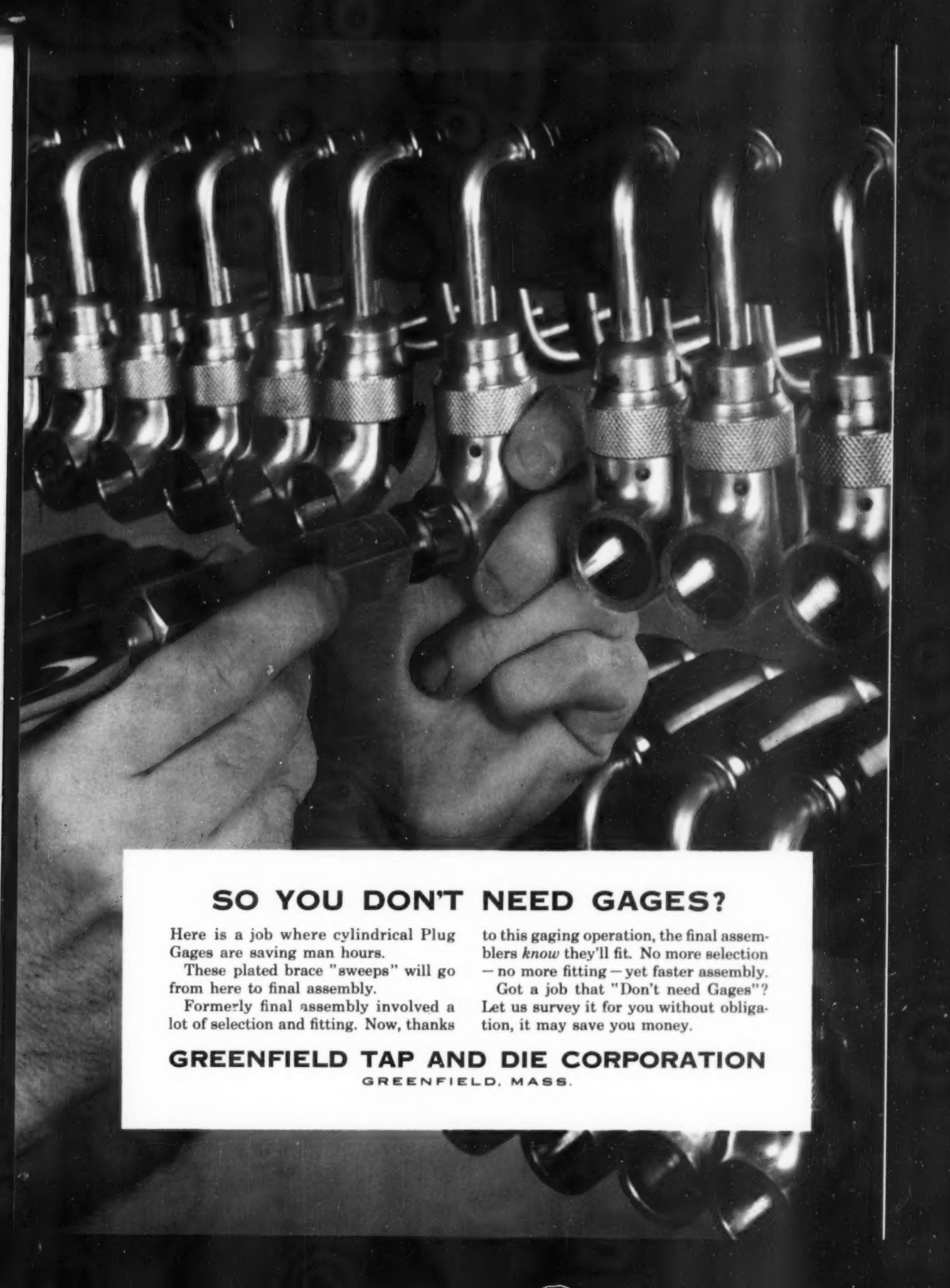
Robert E Anderson has been named president of Robertson Mfg Co, Trenton, N J. Mr Anderson, former executive vice president, succeeds **D P Forst,** now chairman of the board.

H Thomas Hallowell, Jr, president, Standard Pressed Steel Co, Jenkintown, Pa, is the recipient of National Metal Trades Association's 1952 Achievement Award for industrial relations.

Charles D Arcularius has been named director of procurement for Sperry Corp's Ford Instrument Div, Long Island City, N Y. He was formerly Sperry's sub-contract manager.

M A Travis has been named vice president in charge of sales and consultant services, Rack Engineering Co, Connellsville, Pa. He comes to Rack from Nash-Kelvinator Corp, where he was plant engineer for Nash Motors.

Edward H Aldworth, former Chief of NPA's Water Treatment Equipment Section, has been elected vice-president of Belco Industrial Equipment Div, Inc, Paterson, N J.



SO YOU DON'T NEED GAGES?

Here is a job where cylindrical Plug Gages are saving man hours.

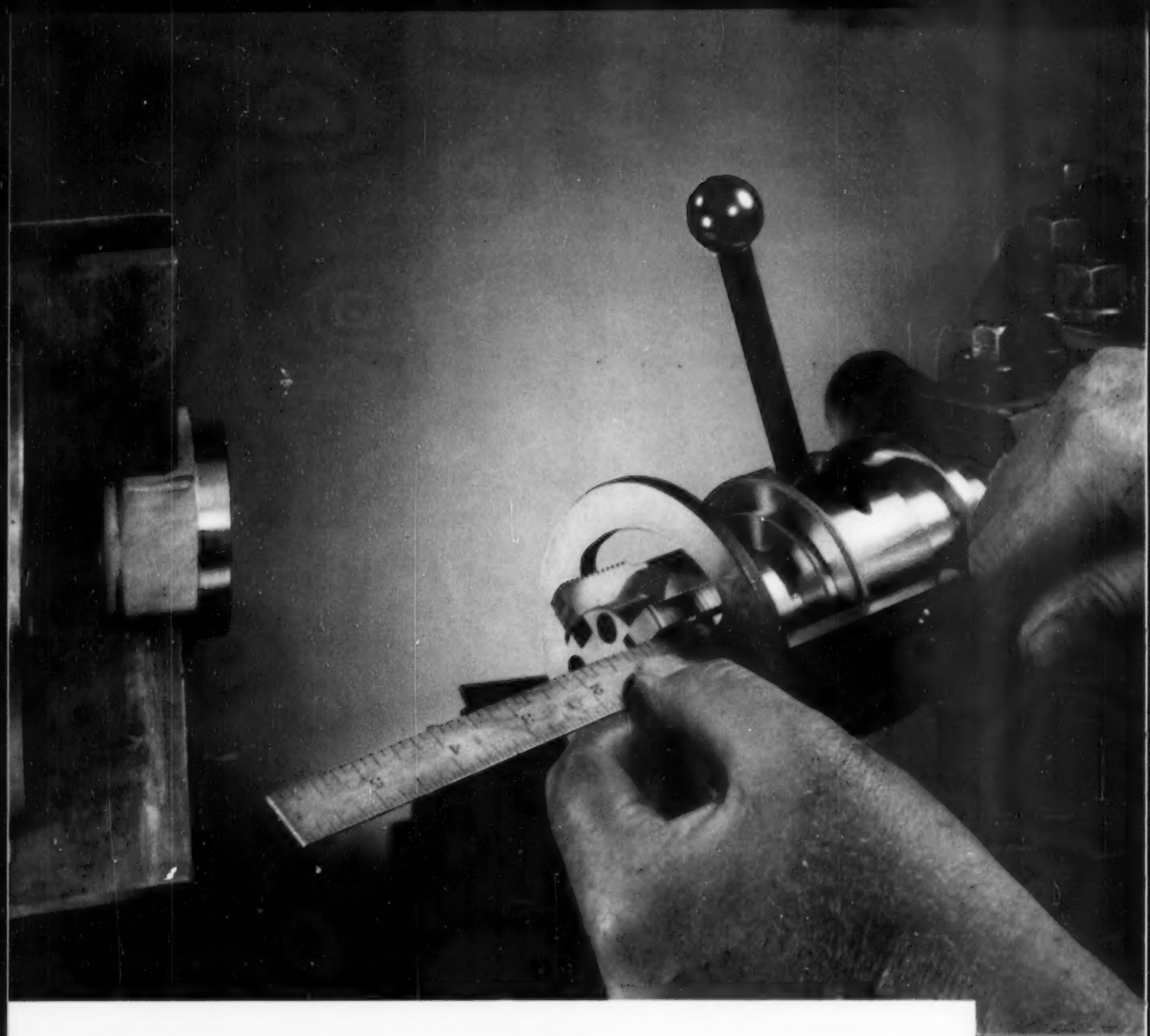
These plated brace "sweeps" will go from here to final assembly.

Formerly final assembly involved a lot of selection and fitting. Now, thanks to this gaging operation, the final assemblers *know* they'll fit. No more selection — no more fitting — yet faster assembly.

Got a job that "Don't need Gages"? Let us survey it for you without obligation, it may save you money.

GREENFIELD TAP AND DIE CORPORATION

GREENFIELD, MASS.



UNIFORM THREADING DEPTH ASSURED!

Here is a GEOMETRIC Collapsing Tap with Ground Thread Chasers and Trip plate that collapses chasers instantly for positive uniformity of thread depth.

These all-purpose universal taps made in eleven sizes will handle practically any tapping job 1 5/16" to 8 1/2" actual diameter — also taper and straight pipe threads. Can be used on most standard machines, both rotary and stationary, without additional parts.

Fast and accurate adjustment by means of positive trip bar binding, ample chip space, and a full flow of coolant to the chasers are popular features among users.

Write for full details. Specify Bulletin S

Greenfield Tap and Die Corporation

GEOMETRIC TOOL COMPANY DIVISION

NEW HAVEN 15, CONNECTICUT

GEO MET RIC

BUSINESS ITEMS

Lockheed Aircraft Corp is planning a $3 million addition to its Burbank, Calif, plant. The addition will be a 392-ft-long assembly line structure that will accommodate parallel assembly lines for radar models of the Super Constellation and PV2 Neptune anti-submarine planes.

Food Machinery & Chemical Corp has acquired **Kingsbury-Davis Machine Co,** Contocook, N H, paper box machinery manufacturer, and **Milwaukee Equipment Mfg Co,** South Milwaukee, Wis, makers of rotary tillage equipment; both will operate as FMC subsidiaries.

Timken Roller Bearing Co will add $1.25 million in new plant construction at its Bucyrus, Ohio, works. Another $2 million will be spent on new equipment for the installation.

Michigan Tool Co, Detroit, is forming a new division to manufacture and market a line of industrial chemical products it has been developing for several years. A plant has been acquired in Detroit and equipment is being installed. Headquarters and sales offices of the Division will be at 7125 E McNichols Rd.

Temco Aircraft Corp and **Luscombe Airplane Corp** are merging, subject to stockholder approval at an April 2 meeting. Officials of both companies say the move is being made in the interests of economy, since Luscombe, which has been acting as a subcontrator for Temco, could be operated as a Temco Division with considerably less accounting and paper work involved.

Hamilton Watch Co, Lancaster, Pa, has established an **Allied Products Div** to develop and manufacture special alloys, machines and precision instruments.

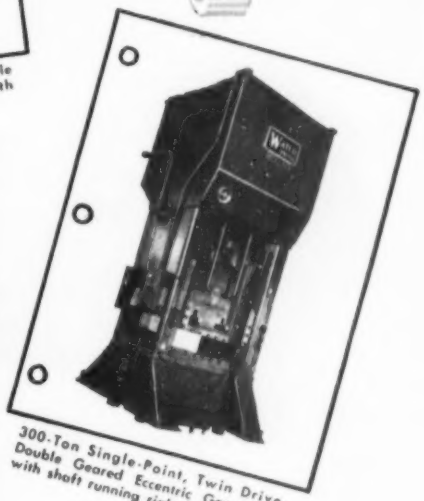
Worthington Corp plans to manufacture a complete line of home air conditioners, from window coolers to central units for year-round cooling and heating.

National Malleable & Steel Castings Co reports its 1952 net sales of $54,304,000 were second highest since World War II. Record year was 1951.

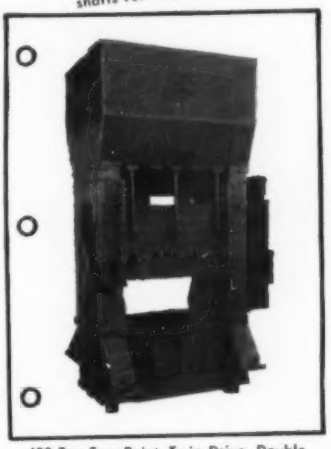
Westcott Chuck Co, Oneida, N Y, has purchased the stock of two-jawed drill chucks and repair parts from **Standard Tool Co,** Cleveland.

600-Ton Two-Point, Twin Drive, Double Geared Eccentric Gear Press with shafts running front to back.

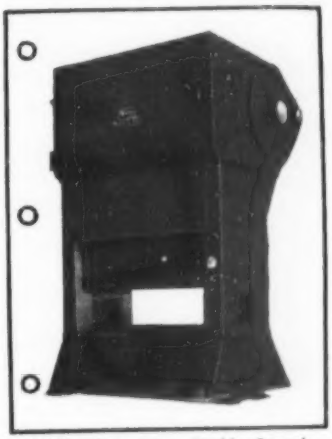
FOUR of the MANY Warco® ECCENTRIC GEAR PRESSES WORKING TODAY



300-Ton Single-Point, Twin Drive, Double Geared Eccentric Gear Press with shaft running right to left.



600-Ton Two-Point, Twin Drive, Double Geared Eccentric Gear Press with shafts running right to left.



200-Ton Twin Drive, Double Geared Eccentric Gear Press with shafts running right to left.

Here are four pages from a book that includes some of the finest mechanical presses built today . . . the Warco line of Eccentric Gear Presses.

Heavy duty with lower maintenance and longer life, greater precision, and increased operating safety is the aim of Warco press builders, in their line of Eccentric Gear Presses.

Warco Eccentric Gear Presses incorporate barrel-type adjustment, all-steel gears with heat-treated alloy steel pinions and steel pitmans fitted with heavy-walled bronze eccentric and saddle bushings. Extra flywheel energy is supplied to insure adequate long-draw capacity. All Warco Presses are equipped with Warco's popular Pneumatic Friction Clutch and Brake, and other features interesting to press users . . . features that contribute to longer press life, greater operator safety, increased production and precision are included in the Warco Eccentric Gear Press design.

The new Warco Eccentric Gear bulletin shows above features in detail

Federal® WELDERS

Warco® PRESSES

THE FEDERAL MACHINE & WELDER COMPANY

WARREN, OHIO

A *better* Lathe from any *angle*.

(1) "Zero Precision" Tapered Roller Bearings—the best Timkens on any lathe. (2) Large collet capacity with Choice of Center Distance. (3) Hobcut gears throughout for smooth operation. (4) Modern full double wall apron. (5) Bed has an engineered backbone. (6) Two V-belts to spindle for greater pulling power. (7) Holds precise accuracy for years.

By whatever standards you measure a lathe—bearings[1], capacity[2], gearing[3], apron[4], bed[5], power to spindle[6], accuracy[7]—whatever is important to you, you will find it completely satisfied in a SHELDON lathe.

SHELDON
CHICAGO U. S. A.

SHELDON MACHINE CO., Inc., 4234 N. Knox Ave., Chicago 41, Ill.

Harvey Machine Co will begin construction on its aluminum reduction mill at The Dalles, Ore, June 30. At present, two optional sites have been chosen, one on each side of the Columbia.

Detroit Stamping Co, Detroit, has opened a new assembly plant for manufacture and packaging of production work-holding tools.

Thor Power Tool Co is the new name of **Independent Pneumatic Tool Co,** Aurora, Ill. The company's products have long been identified with the trade name "Thor" and the new name makes for easier identification of product with company.

American Steel & Wire Co has awarded contracts for construction of the world's largest merchant last furnace (1350 tons daily capacity). Located in Cleveland, the furnace will be completed in 14 months.

Thompson Products, Inc, has purchased a 70,500 sq ft plant, formerly owned by **Holley Carburetor Co,** at Portland, Mich, where it will manufacture tie rods, drag links, truck bearing housings.

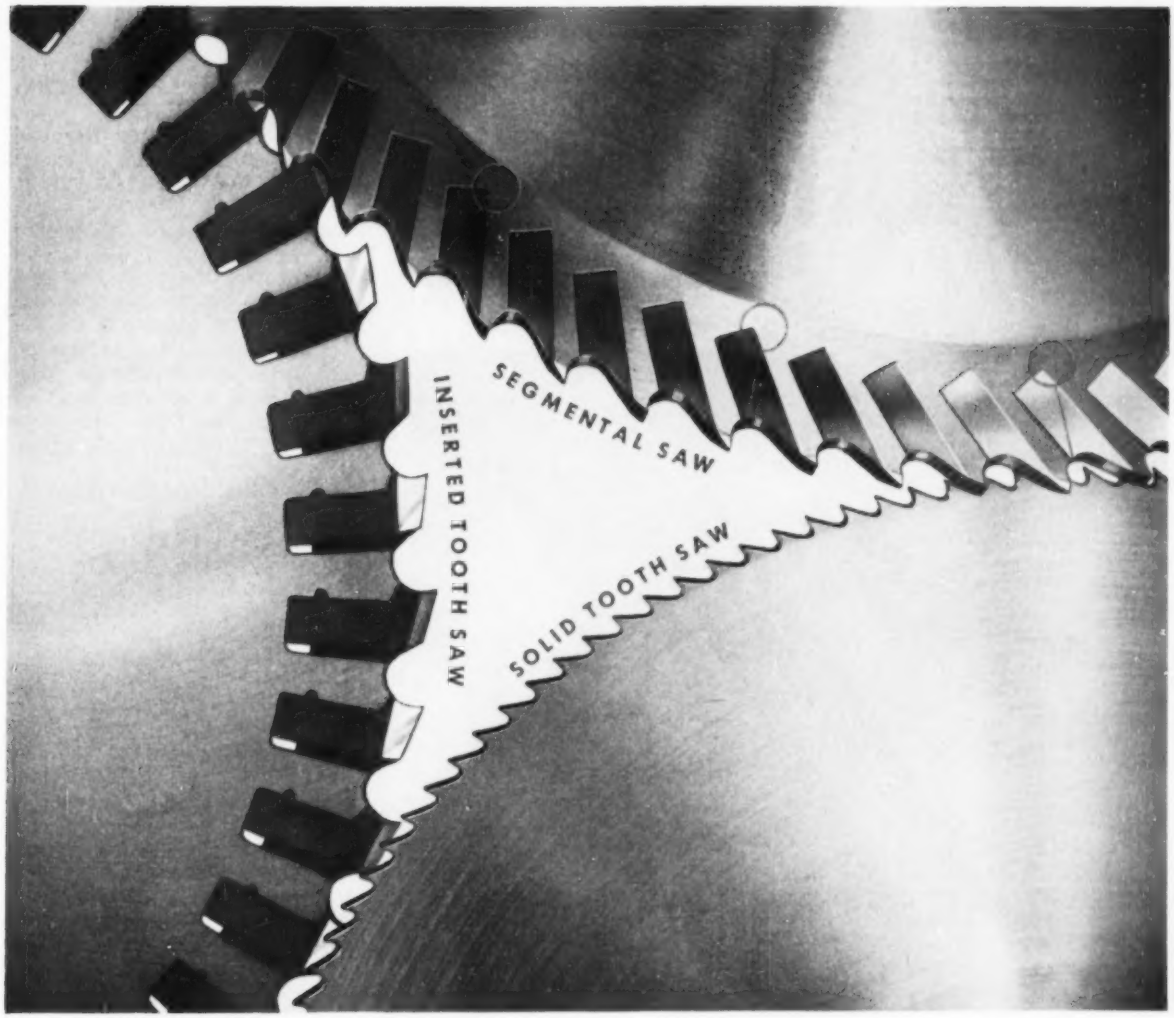
Aluminum Co of America's aluminum reduction plant at Wenatchee, Wash, has reached full production with installation of a fourth potline, capable of producing 17 million lb per year.

Hydropress, Inc, New York, is designing and building a rolling mill for fabrication of tapered aluminum alloy plates and sheets for use in military aircraft. Largest installation of its kind, the 145-in four-high rolling mill will permit hot or cold running of aluminum alloy sheets and plates from 0.032" to 3.0" thickness. Operation is scheduled for late '53.

National Lead Co plans to operate its newly acquired **Pioneer Alloy Products Div** as part of its Metal Dept. Pioneer will produce corrosion-resistant valves and heat-resistant castings.

Rudisill Foundry Co, Anniston, Ala, manufacturer of soil and water pipe, has been awarded a $6,688,000 Army shell contract.

National Can Corp has moved its headquarters from New York to Chicago. Firm's Eastern Div Sales office will remain in New York.



"Pick your Teeth!"

For the best saw-performance on your job... SIMONDS gives you a choice of *All 3 Types!*

INSERTED TOOTH: For heavy production cutting of all steel, brass, copper, and aluminum. Alternating square and beveled teeth "tri-vide" chips for easy cutting and clearance. Teeth can be easily replaced, singly or in complete sets, in your own plant by any average mechanic.

SOLID TOOTH: For general shop cut-off jobs . . . for use on smaller automatic cut-off machines and for cutting jobs where narrow kerf is important.

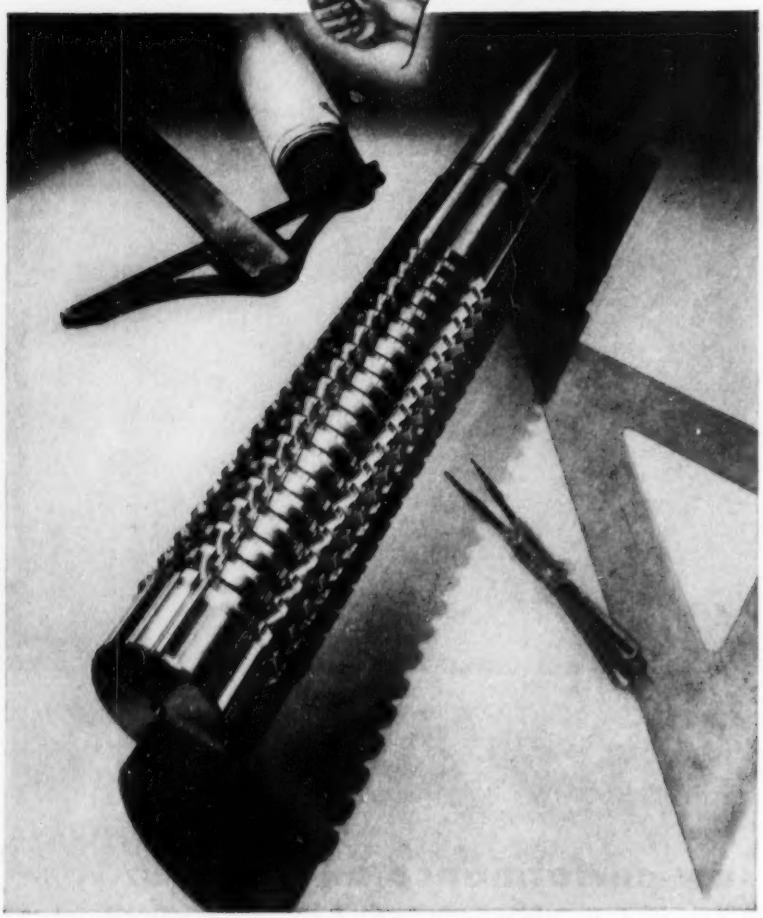
SEGMENTAL: For especially smooth cuts on production work. High Speed steel toothed segments are securely held in a tough alloy plate by a special tongue and groove design, have quick clearance for faster, freer cutting.

SIMONDS MAKES ALL THREE TYPES OF CIRCULAR METAL-CUTTING SAWS. So you can be sure that SIMONDS will give you *the right saw for your job* . . . for any type of machine. See your Simonds Distributor today, or write the nearest Simonds Office.

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que.
Simonds Divisions: Simonds Steel Mill, Lockport, N. Y., Simonds Abrasive Co., Phila., Pa. and Arvida, Que., Canada

CONNECTICUT
DURAKEEN BROACHES
DURABILITY WITH KEENNESS



MORE PIECES PER GRIND ● MORE GRINDS PER BROACH
BETTER QUALITY WORK

The real extent of the manufacturing economies a fine broach makes possible is still a field of rich surprises . . . especially when you mount a Connecticut Durakeen Broach on any of your machines.

From surface to core, a Durakeen Broach gives you the sharp, hard teeth with correct undercut for unbroken chip curling, the differential tooth spacing that prevents broach chatter and wave, the absolutely straight body that insures smooth, true travel. Durakeen, heat treated by skilled operators to exact exposures, is our finest steel . . . your guarantee of highest quality work. "Better Broach it with Connecticuts!"

THE CONNECTICUT BROACH AND MACHINE COMPANY
NEW LONDON, CONNECTICUT
1CB53B

Eastman Kodak Co's Destillation Products Industries has been sold to **Consolidated Engineering Corp** of Pasadena, Calif, and will be renamed **Consolidated Vacuum Corp.** The new company will continue to manufacture DPI high-vacuum equipment at its Rochester, NY, plant.

Maysteel Products, Inc, Milwaukee, announces formation of a subsidiary, **Gleason Reel Corp,** to take over manufacture of Gleason industrial reels from **J L Gleason & Co, Inc,** Cambridge, Mass. Production will continue in the Cambridge plant, augmented by distribution and manufacture at Mayville's Milwaukee plant.

Niagara Filter Corp, Buffalo, recently sold its industrial filter inventories and use of its name to **American Machine & Metal Co.** AMMCO is also leasing dies, jigs, drawings and patterns for the filters, and plans to move filter operations to its East Moline, Ill, plant.

Gisholt Machine Co's Chicago sales office has moved to 6920 W North Ave. New phone is MErrimac 7-5618.

Air Reduction Sales Co is beginning construction of a liquid oxygen plant in Riverton, NJ, to serve Delaware River Basin industries.

TEMCO Aircraft Corp, Dallas, has been given Bureau of Aeronautics approval to build a 58,000 sq ft office building addition, a 30,000 sq ft paint hangar and a 7500 sq ft paint stripping bulding. All are to speed production of TEMCO's McDonnel F3H Demon.

Affiliated Gas Equipment Co, Cleveland has purchased **Toronto Hardware Mfg Co,** Toronto, Ont, in a move to expand its heating equipment manufacturing operations into Canada.

Fonda Gage Co, Stamford, Conn, announces that all its sales will henceforth be made through **Fonda Gage Sales Corp,** 38 Broad St, Port Chester, N Y.

Zagar Tool, Inc, Cleveland, doubled its plant capacity last year and added 2000 sq ft to its sales and engineering facilities.

General Motors Institute is adding an 83,000 sq ft building to its present structure at Flint, Mich, expanding its classrooms, laboratories and service areas by approximately 40%.

ARO AIR TOOLS

help RYAN *Step up* AIRCRAFT PRODUCTION!

SCREW-DRIVING . . . Aro Air Screwdriver used to install Phillips screws in windshield frames of Ryan-built refueling pods for huge Boeing KC-97 aerial tankers.

GRINDING . . . Aro Grinder rapidly grinds smooth the weld seam metal on large Ryan-built stainless steel exhaust system for Boeing B-50 bomber.

WIRE BRUSHING . . . Aro tool with wire brush removes excess flux and scale from Ryan-built inner exhaust cone for General Electric J-47 jet engine.

Ryan Aeronautical Co. in San Diego, Calif. *speed-lines production* of assemblies for jet engines, bombers, aerial tankers and other aircraft—with the help of ARO Air Tools!

Do you need more speed to cut costs in drilling, grinding, polishing, screw driving and other operations? Perhaps ARO can help you!

An ARO Field Engineer will gladly assist in engineering your job or *contact your ARO distributor.*

The Aro Equipment Corp., Bryan, Ohio

Aro Equipment of Canada, Ltd., Toronto, Ont.

ARO *The Leader!* **AIR TOOLS**

Also . . . LUBRICATING EQUIPMENT . . . HYDRAULIC EQUIPMENT . . . AIRCRAFT PRODUCTS . . . GREASE FITTINGS

MAMMOTH—

or MINIATURE....

The LONG and SHORT of Measuring Versatility

From four inches to fifteen feet, there's an ETALON Instrument to meet your needs!

Manufactured of *specially selected* STAINLESS STEELS — HARDENED and NORMALIZED — ETALON CALIPERS are helping to maintain standards of accuracy in shops the world-over.

Whenever you require *accurate and dependable* calipers, micrometers, height gauges, indicators or other precision measuring instruments — follow America's leading manufacturing plants — *SPECIFY ETALON TO BE SURE OF THE FINEST!*

ETALON

P. ROCH ROLLE. "SWITZERLAND"

ACCURACY

Ask your dealer or write us!

ALINA CORPORATION

401 BROADWAY, NEW YORK 13, N. Y.

PLANT EXPANSIONS

Prestole Corp, Toledo, Ohio, metal fastening manufacturer, has purchased the plant adjacent to its factory at a cost of $151,000.

Powder-Craft Corp is completing a 10,000 sq ft plant in Spartanburg, S C, for the manufacture of machinery parts from powdered metal.

Precision Diamond Tool Co, Chicago, opened its new manufacturing plant at Elgin, Ill., on March 2. All on one floor, the plant contains latest equipment for manufacture and quality control of diamond tools and wheels.

G A Gray Co, Cincinnati, has made sizable additions to its plant facilities to provide space for the installation of machine tools.

Plate & Structural Steel Co is building a $750,000 steel fabricating plant near Toronto for manufacture of hoppers, tanks, conveyors and other steel plate products.

Joseph T Ryerson & Son, Inc, Chicago, has started construction of a 166,000 sq ft steel service plant to replace its present plant in Milwaukee.

Fenn Mfg Co, Hartford, Conn, is building a $1.25 million plant for manufacture of helicopter rotor heads and gear transmissions at Newington, Conn. New plant is expected to double Fenn's capacity.

A O Smith Corp, Milwaukee, announces opening of a branch of its Product Service Div at Oakland, Calif. The new 12,000 sq ft building will serve users of Smith's line of heating equipment and welding accessories.

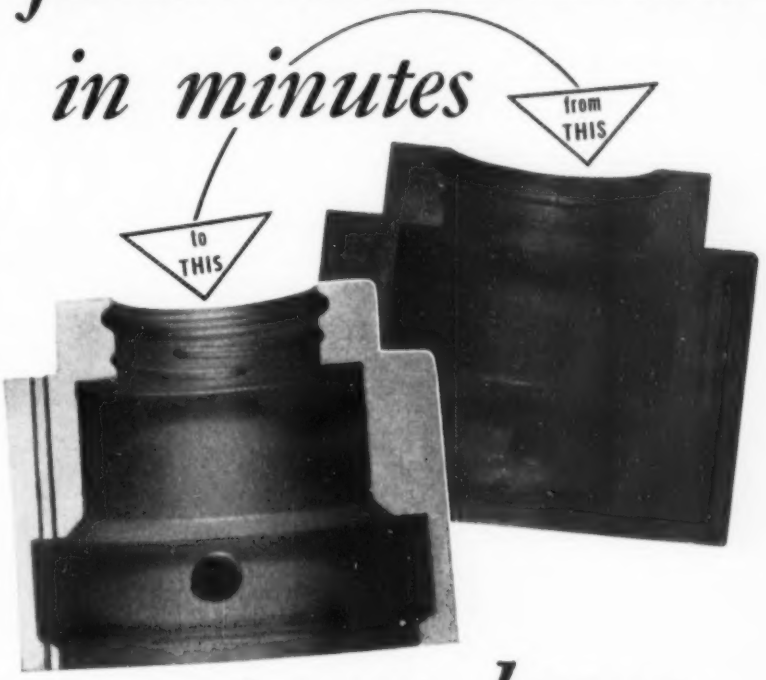
Maremont Automotive Products, Inc, is starting construction of a leaf spring manufacturing plant at San Juan, Puerto Rico.

Hiller Helicopter Co, Palo Alto, Calif, is constructing a 15,900 sq ft engineering test building adjacent to its present production building. Cost: $87,000.

Edgcomb Steel Co, Philadelphia, has purchased seven acres of land in York, Pa, where it will erect a large steel warehouse . . . Serving York and vicinity, the warehouse will stock a full line of carbon steel, stainless, tool steel, aluminum and hot rolled products.

finish TOOLS, DIES and MOLDS

in minutes



. . . and *save hours*

with LIQUAMATTE wet blasting

It takes only 30 seconds to 10 minutes to finish tools, dies, molds, engine parts, etc. with a Liquamatte — an operation that formerly required 1 to 6 hours by hand methods. Scale, fine burrs and grinding lines are removed in a fraction of the time previously possible. For example, savings as high as 80% have resulted on some parts at the Oling Tool Company.

Liquamatte Wet Blasting has eliminated many manual surfacing operations, transforming precision finishing into a mass production operation. It has eliminated all manual polishing except on surfaces where a mirror finish is desired. And the mirror finish is achieved in far less time on a Liquamatte finished surface.

See how Liquamatte Wet Blasting can save time and money for you. *Send today for the bulletins of your choice below.*

THESE BULLETINS TELL HOW

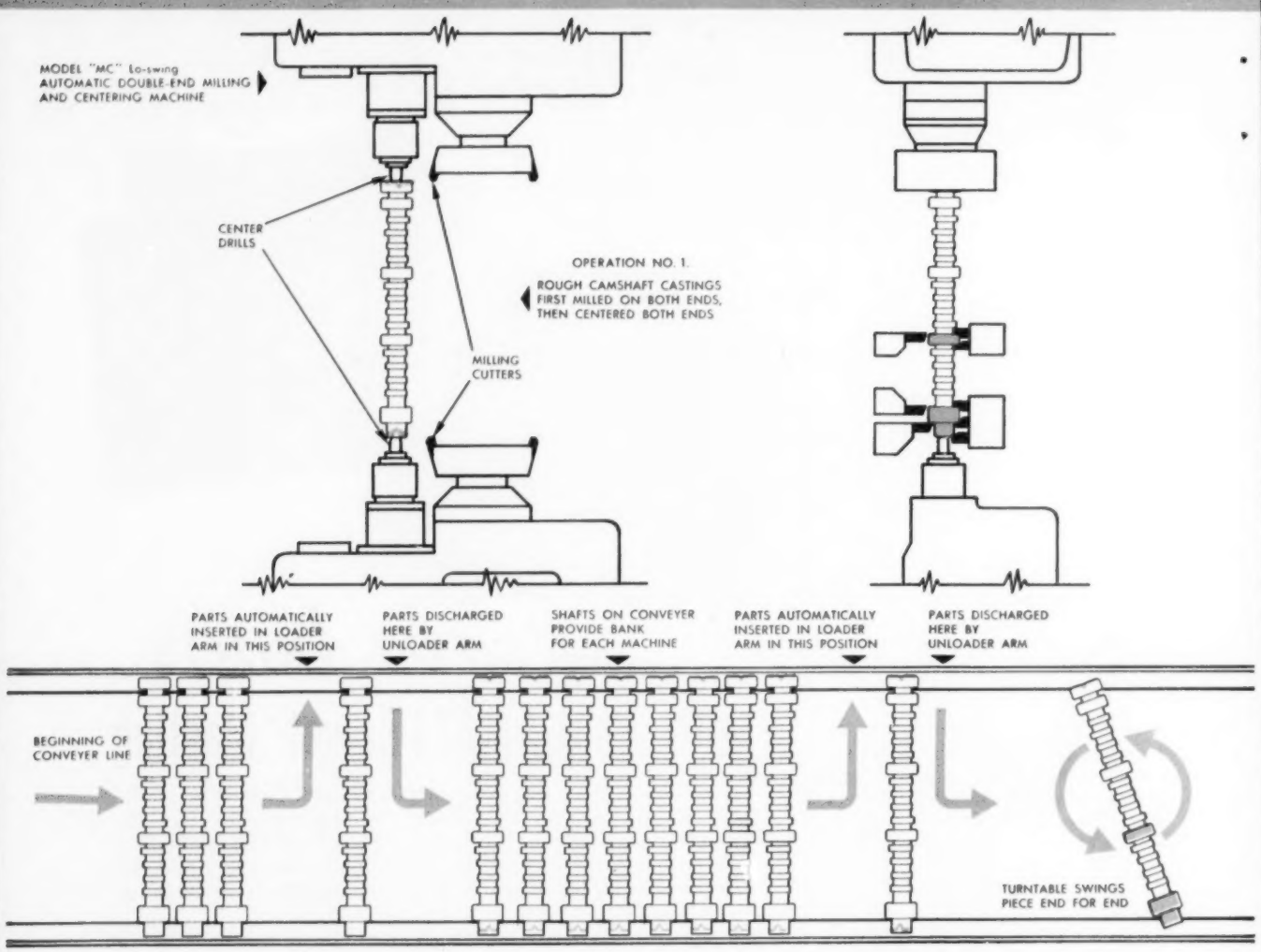
Save Time on Tools, Dies, Molds. | Save Time on Glass Molds | Save Time on Plastic Molds.

American WHEELABRATOR & EQUIPMENT CORP.

LIQUAMATTE WET BLASTING

317 S. Byrkit St. Mishawaka, Ind.

MACHINE OF



THREE-UNIT TYPE *Lo-swing* TRANSFER INSTALLATION

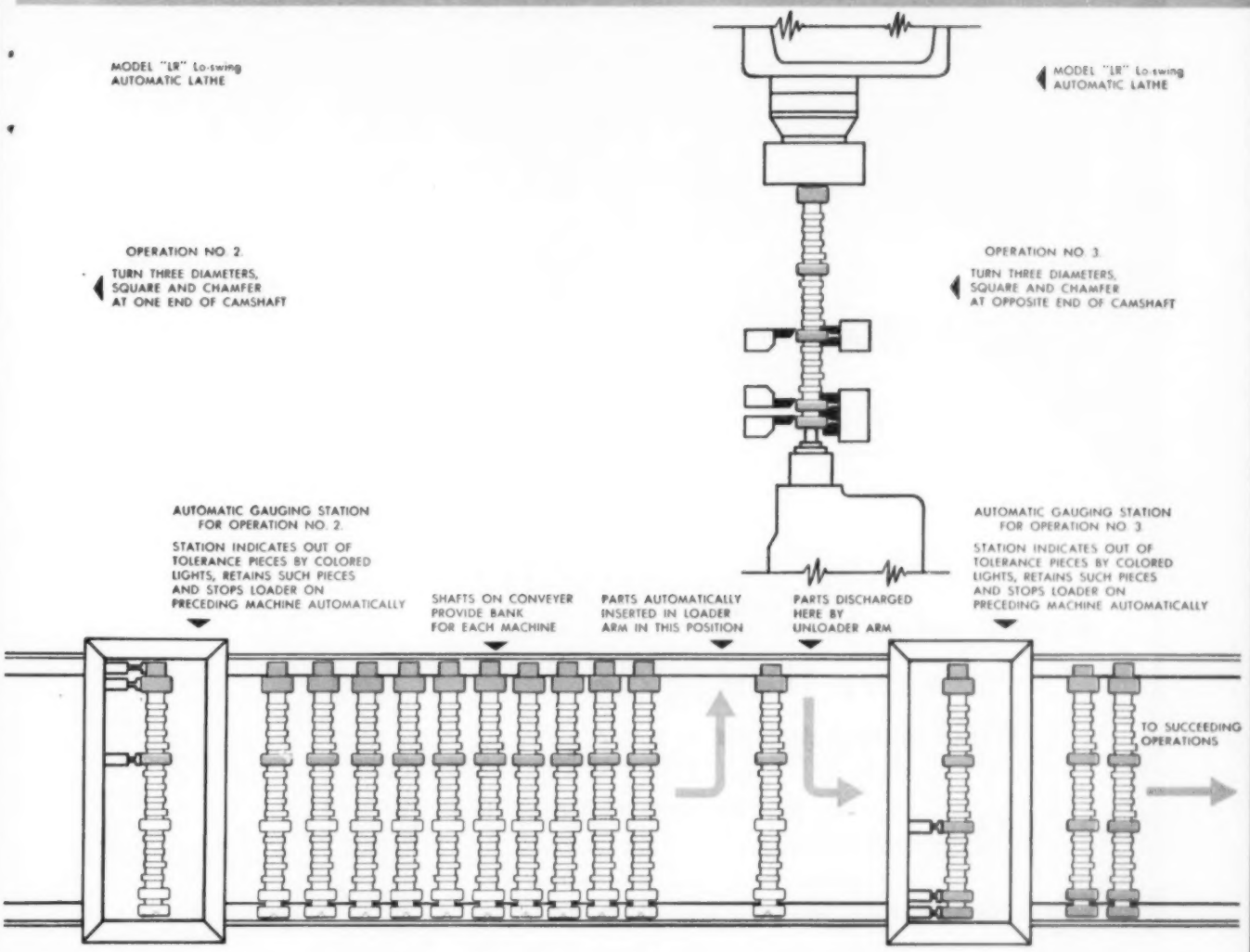
The installation diagrammed above illustrates the New Lo-swing principle of Work Loading and Work Transfer which offers impressive economies by carrying automation far beyond the cyclic operation of individual machines. Rough work enters this system at the left and goes through three machining and two gauging operations *automatically*. Cycle time on individual operations varies without affecting smooth operation of the installation. Safety and Quality Control Devices instantly detect and signal off-tolerance pieces.

The possibilities of this principle in the manufacture of repetitive parts are almost limitless ...the safety and economic advantages, tremendous. Your specific inquiries are invited.

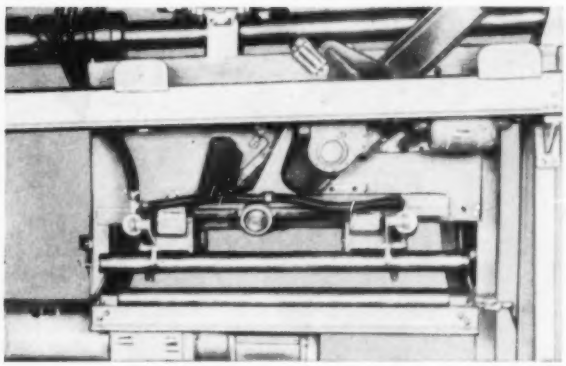
SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS

THE MONTH

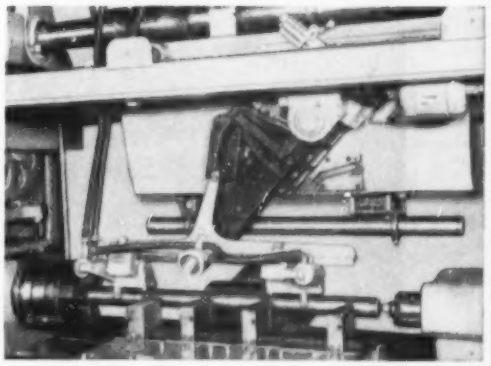

MODEL "LR" Lo-swing AUTOMATIC LATHE
MODEL "LR" Lo-swing AUTOMATIC LATHE
OPERATION NO. 2.
TURN THREE DIAMETERS, SQUARE AND CHAMFER AT ONE END OF CAMSHAFT
OPERATION NO. 3.
TURN THREE DIAMETERS, SQUARE AND CHAMFER AT OPPOSITE END OF CAMSHAFT
AUTOMATIC GAUGING STATION FOR OPERATION NO. 2.
STATION INDICATES OUT OF TOLERANCE PIECES BY COLORED LIGHTS, RETAINS SUCH PIECES AND STOPS LOADER ON PRECEDING MACHINE AUTOMATICALLY
SHAFTS ON CONVEYER PROVIDE BANK FOR EACH MACHINE
PARTS AUTOMATICALLY INSERTED IN LOADER ARM IN THIS POSITION
PARTS DISCHARGED HERE BY UNLOADER ARM
AUTOMATIC GAUGING STATION FOR OPERATION NO. 3.
STATION INDICATES OUT OF TOLERANCE PIECES BY COLORED LIGHTS, RETAINS SUCH PIECES AND STOPS LOADER ON PRECEDING MACHINE AUTOMATICALLY
TO SUCCEEDING OPERATIONS

CUTS OVERALL CAMSHAFT MACHINING COSTS

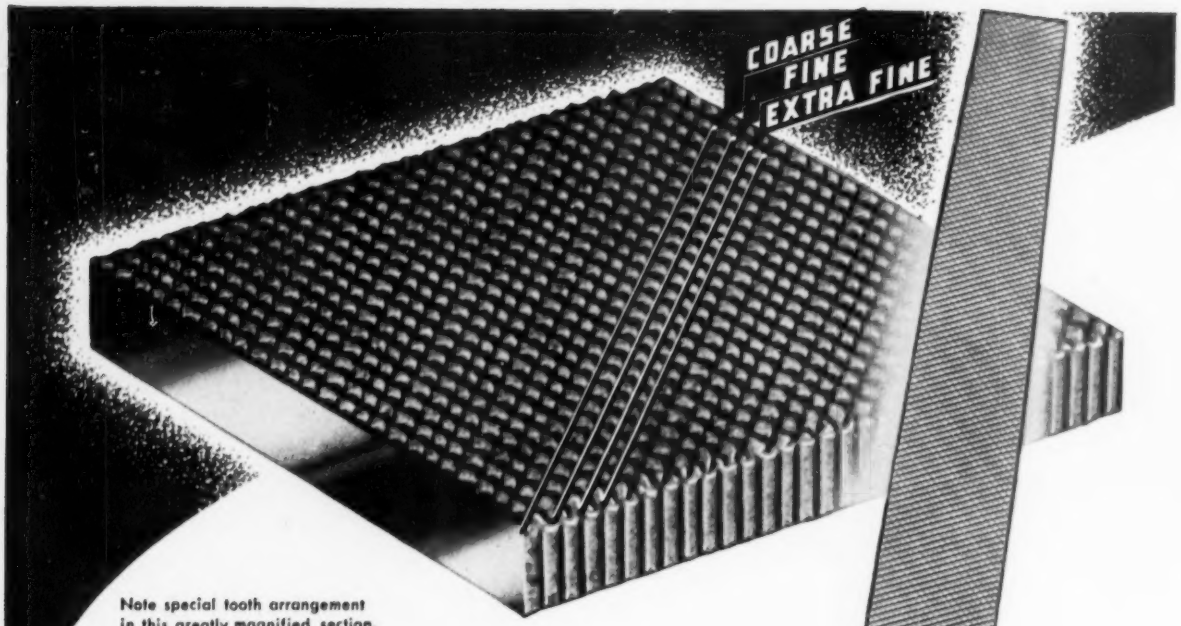


Seneca Falls Automatic Work Loader. Trolley at Work Transfer Station over Conveyor Line. Unloader Arm has discharged finished shaft. Loader Arm has picked up and is holding rough shaft.

Seneca Falls Automatic Work Loader. Trolley at Machine Station. Rough shaft just placed on centers. Unloader Arm holds finished shaft for delivery to Conveyor Line.



ARE LOWER WITH *Lo-swing*



Note special tooth arrangement in this greatly magnified section.

here's why Heller NUCUT wavy teeth* save half your work

★ Scientific tooth spacing provides double-action filing—cuts fast and deep, finishes smooth and scratch-free. This same feature eliminates chattering and makes possible a more durable, longer lasting file. Order from your local distributor.

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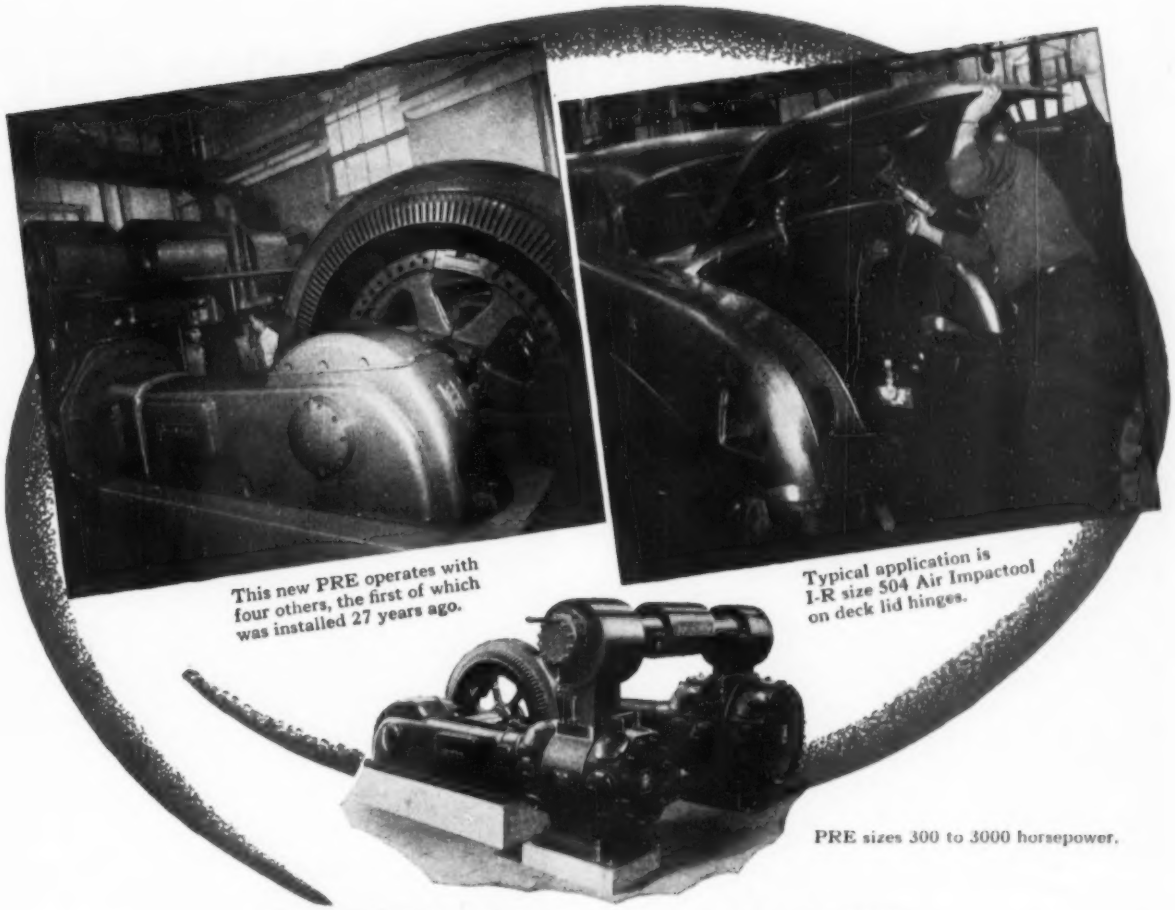
American-Swiss
VIXEN NUCUT


This new PRE operates with four others, the first of which was installed 27 years ago.
Typical application is I-R size 504 Air Impactool on deck lid hinges.
PRE sizes 300 to 3000 horsepower.

HUDSON MOTOR COMPANY HAS SELECTED PRE COMPRESSORS SINCE 1925

Air Capacity of Gratiot Plant is now 13,200 cfm at 100 psi

When a fifth Ingersoll-Rand PRE Compressor went into operation recently, the Gratiot Plant of the Hudson Motor Company boosted its compressed air capacity from 10,000 cfm to 13,200 cfm. Thousands of air-operated tools, welders, paint sprayers and presses on the Hudson assembly lines set the pace which required this additional air capacity. The newest PRE operates along with four older PRE synchronous-motor-driven compressors. The first one was installed 27 years ago and is still going strong.

This is only one example of the dependability and reliability for which Ingersoll-Rand PRE Compressors are known. They are heavy-duty machines built for full-load service wherever large volumes of air or gas are to be handled. The two-cylinder design is standard on sizes up to 1000 horsepower. The 4-cylinder or so-called "4-corner" design is used on the larger sizes up to 3000 horsepower.

For the full story on the PRE, consult your nearest I-R representative.

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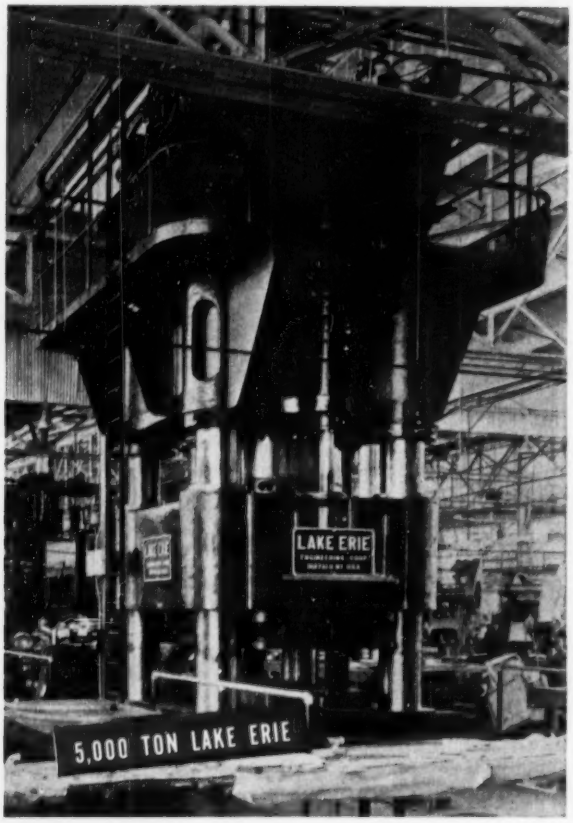
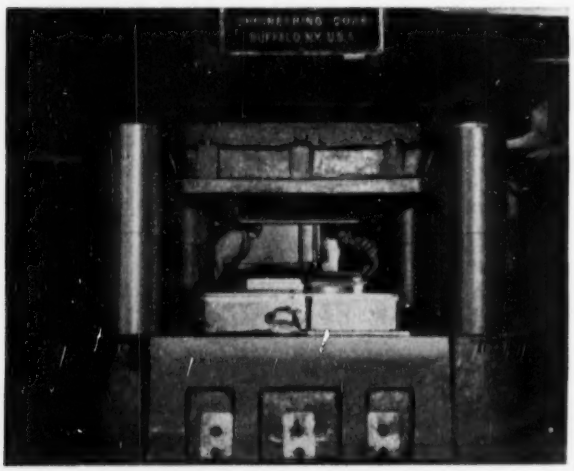
COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • DIESEL AND GAS ENGINES

Lake Erie Hydraulic Presses play



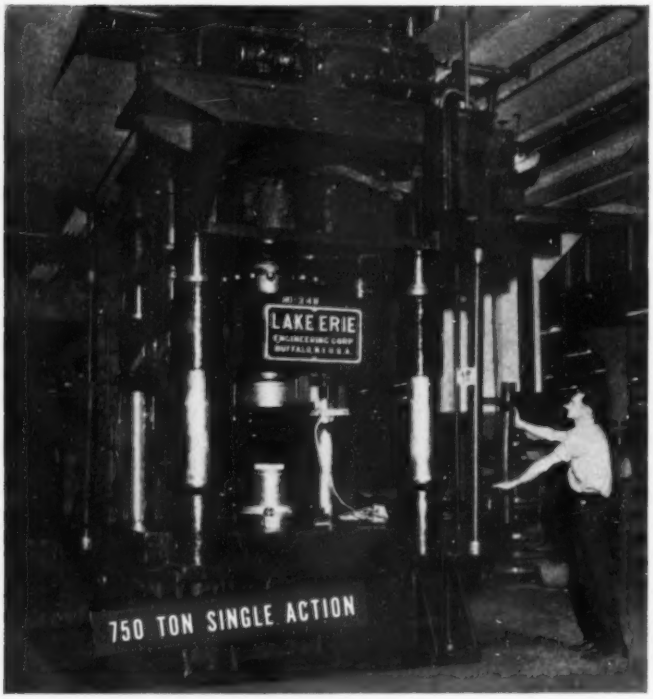
THE "BIG" PRESS AT CHANCE VOUGHT is a 5,000 ton Lake Erie fitted with a rubber pad. Press is shown forming four parts in a single operation. Two are for Chance Vought's F7U Cutlass fighter and two are for a Lockheed subcontract. Material used is 24 S O Aluminum of .051 gauge.

CHANCE VOUGHT'S 1,000 TON LAKE ERIE is shown forming a jet oil tank part under a contract with Pratt & Whitney Aircraft Company. The parts are formed from Aluminum. Lake Erie presses produce hundreds of different parts for Chance Vought.



Over 75% of all U.S. aircraft manufacturers utilize Lake Erie equipment

a Leading Part in the production of Chance Vought Aircraft



THIS 750 TON PRESS illustrates the versatility of Lake Erie hydraulic equipment. It is being used in this instance for an experimental setup employing very high forming pressures. The wires are connected to electrical strain gauges to insure that the S O Aluminum is not overstressed.

● **Wide-variety of parts for famous Corsair and Cutlass fighters, and for subcontractors, is produced on Lake Erie Equipment.**

PICTURES TELL THE STORY

The wide use of Lake Erie Hydraulic Presses by Chance Vought is a typical aircraft industry practice. Over 75% of all U. S. aircraft manufacturers utilize Lake Erie equipment. With the most complete line of hydraulic presses to choose from...over 3,500 designs from 5 to 22,000 tons capacity...and the most extensive experience in the aircraft industry, Lake Erie is the logical one to consult about your hydraulic press needs. Our experienced engineers will be glad to discuss your requirements. No obligation, of course.

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ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

MANUFACTURERS OF HYDRAULIC PRESSES AND DIE CASTING MACHINES

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LAKE ERIE HYDRAULIC PRESSES are available in any size . . . standard, modified and special designs—horizontal and vertical types—for Metal Working—Plastics Molding—Forging—Metal Extrusion—Processing—Vulcanizing—Laminating—Stereotype Molding—Matrix Forming—Briquetting—Baling—Special Purpose.

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DEPENDABILITY...
that builds dividends
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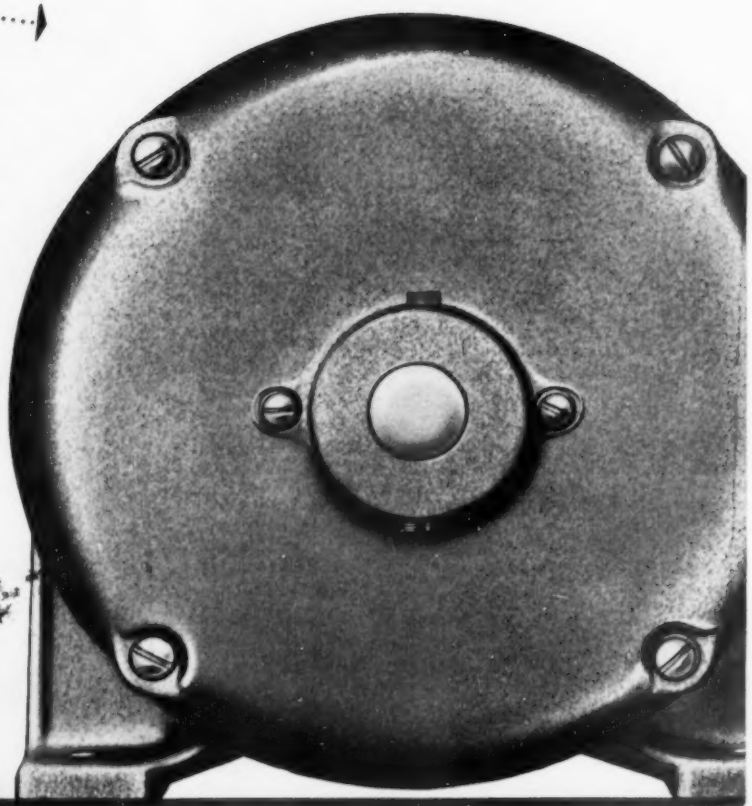
Delco integral motors are one item of manufacturing cost that does not come under the head of "variable." They are so consistently dependable in operation that they have a stabilizing effect on production costs—and on dividends.

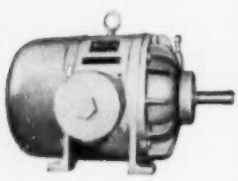
There are Delco motors for most applications—motors that will fit into **your** needs. A sales engineer from any one of the offices listed below will respond to your inquiry.



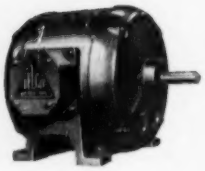
DELCO
DAYTON OHIO

DELCO PRODUCTS

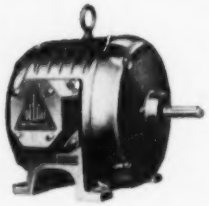
Division of General Motors Corporation
Dayton, Ohio



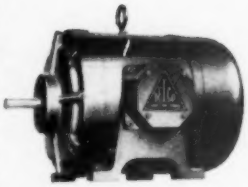
Explosion-Proof Motor



Open Ball-Bearing Motor



Totally Enclosed Motor



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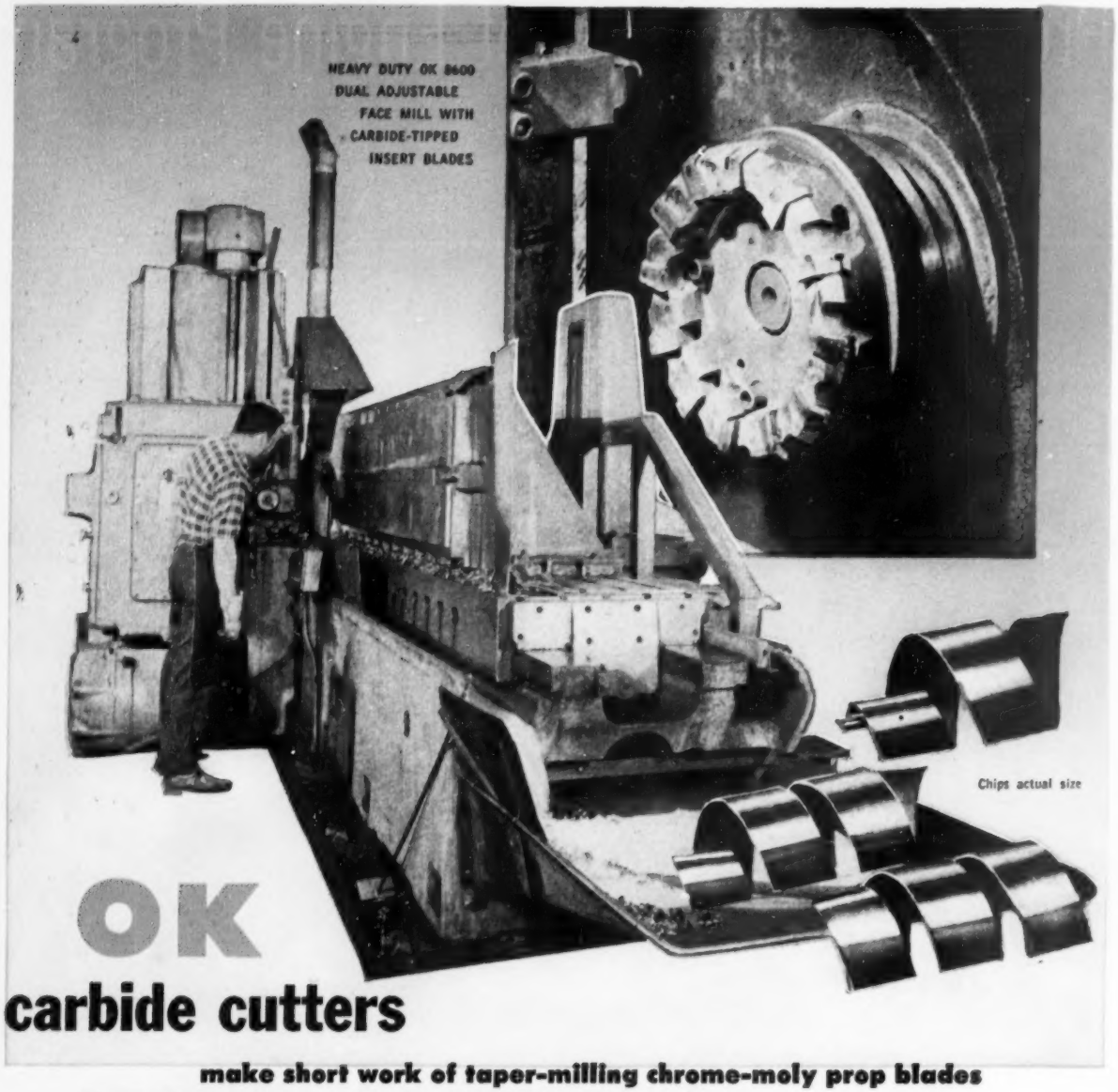

OK carbide cutters

make short work of taper-milling chrome-moly prop blades for B-36 Bombers at Curtiss-Wright Caldwell plant

Here is a good example of how progressive management speeds up heavy milling operations with carbide cutters. The machine is a high powered planer-type miller with mechanical feed and magnetic chuck. The cutter is a heavy duty OK 8600 dual adjustable carbide face mill. Work pieces are tough chrome-molybdenum steel 25" x 123" x .800" for C-W hollow propeller blades for famous B-36 Intercontinental Bombers. Each plate is taper milled for a distance of 107 inches, above and below center rib, the depth of cut increasing from zero to .390 inches. The lower half is milled on the forward stroke and the upper half is milled on the reverse stroke, at the rate of 23 inches per minute. A movie of this operation dramatically shows chips piling on the magnetic chuck and presto! . . . they drop when chuck is demagnetized.

OK carbide milling cutters are built for solid performances like this. They have the strength of simple construction – two-piece body and wedge-shape blades. Mating serrations insure blade security and provide for blade advancement to compensate for wear. No locks, wedges or screws weaken or mar the streamline design. With more beef in the body, OK cutters can better stand the terrific pressures of modern high speed milling.

If you have a milling problem, you should have OK catalog 13. An OK engineer will be glad to give the benefit of our experience over the past 50 years.

OK

modern milling cutters for modern milling machines

THE OK TOOL COMPANY, Milford, New Hampshire

MORE AIR Per Horse Power

- IT'S TWO-STAGE
- IT'S AIR COOLED
- SELF OILING

The New Curtis

MODEL 98 AIR COMPRESSOR

TWO-STAGE AIR COOLED 15 AND 20 HORSEPOWER

TWO-STAGE — More air per kilowatt hour, assuring savings in power bill.

AIR-COOLED — No expensive water bills; eliminates plumbing installation costs.

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TWO TIMKEN MAIN BEARINGS — Tapered rollers; provide easy adjustment made externally without dismantling compressor.

VALVES — Readily removable as assembled units without removing cylinder head or breaking pipe connections or gasket joint.

CRANKSHAFT — Counterbalanced, drop forged — two main bearings — no overhung bearing.

PRECISION WORKMANSHIP — Assures long life and minimum maintenance.

EXPERIENCE — Backed by 99 years of manufacturing — assures you dependable, troublefree service.

Available as a simple compressor or base mounted — motor driven.

LET ONE MAN DO THE WORK
with this Curtis air-operated equipment.

AIR CYLINDERS — for almost any pushing, pulling or hoisting operation.

AIR HOISTS — for low-cost lifting or lowering of materials or machines.

-726

CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Co.
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☐ THE NEW MODEL 98 ☐ AIR HOISTS ☐ AIR CYLINDERS
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CURTIS PNEUMATIC MACHINERY DIVISION of Curtis Manufacturing Company

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Panel of bare 24ST Aluminum, untreated. Extensive corrosion after 168 hours in salt spray.

Panel of bare 24ST Aluminum, treated with Bonderite 710. No corrosion after 168 hours in salt spray.

Panel of bare 24ST Aluminum, treated with Bonderite 710. In excellent condition after 1008 hours in salt spray.

SALT SPRAY TESTS SHOW CORROSION RESISTANCE

ALUMINUM gets increased corrosion resistance, greater durability for paint, with BONDERITE* 710

Here's the surface treatment that practically ends the problem of corrosion on aluminum. Even on high-strength alloys, most susceptible to corrosion, Bonderite 710 protects bare metal for amazingly long periods without failure. Its performance as a base for paint is outstanding.

Bonderite 710 produces an amorphous chromate coating on aluminum surfaces. It can be applied by spray, immersion, or brush, on sheets, castings, forgings and extruded and rolled forms. It operates at low temperatures and is sludge-free.

Bonderite 710 is a liquid—safer and easier to handle, easier to use, more positive in results.

This product's performance equals (*exceeds*, in most important requirements) the government specifications for chemical treatment of aluminum and its alloys.

For bare corrosion resistance, or as a corrosion-resistant base for paint, investigate Bonderite 710 for aluminum.

SEND FOR FREE TECHNICAL BULLETIN—Write today for FREE illustrated bulletin on "Bonderite 710 for Aluminum".

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BONDERITE and BONDERLUBE—aids in cold forming of metals
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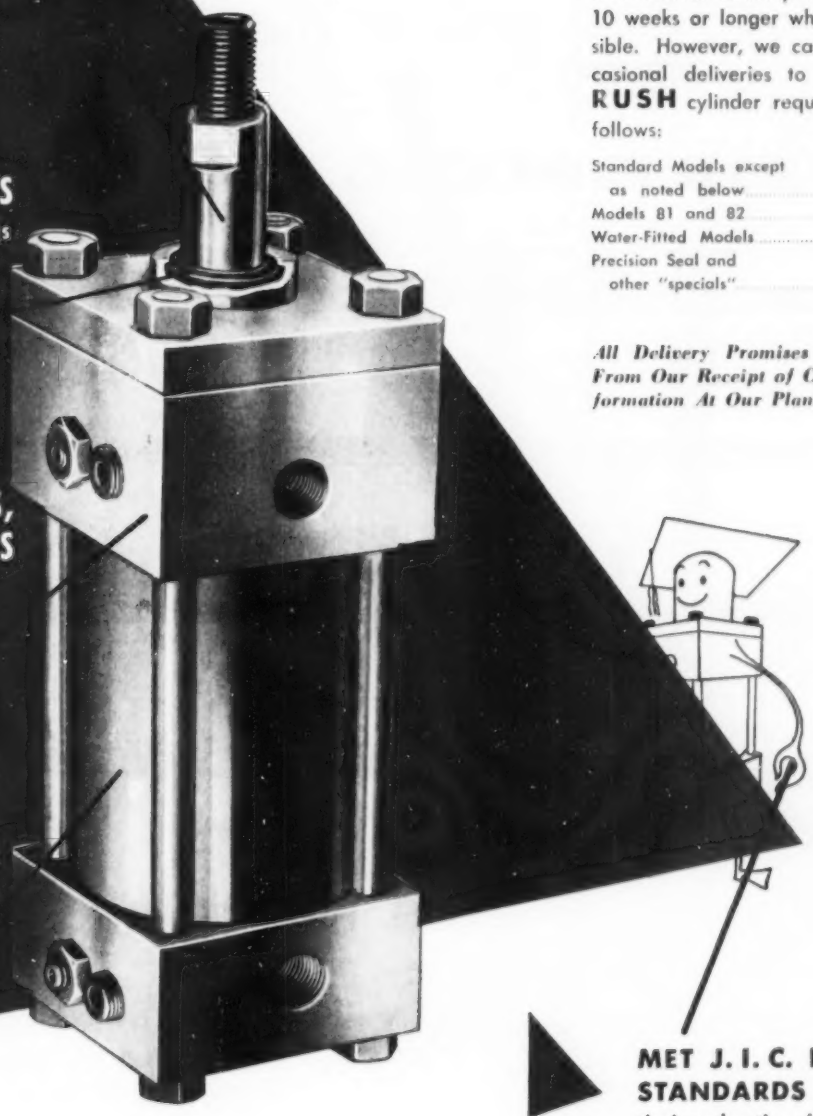
HARD CHROME PLATED PISTON RODS
Prevent Scratch-Damage, Nicks and Rust

DIRT WIPER SEALS
Protect Rods, Seals, Bushings

SOLID STEEL HEADS, CAPS and MOUNTINGS
Eliminate Breakage

BRASS BARRELS
Eliminate Rust and Corrosion



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Our normal delivery is now 8 to 10 weeks or longer whenever possible. However, we can make occasional deliveries to meet your **RUSH** cylinder requirements as follows:

Standard Models except as noted below	4—5 weeks
Models 81 and 82	6—7 weeks
Water-Fitted Models	7—8 weeks
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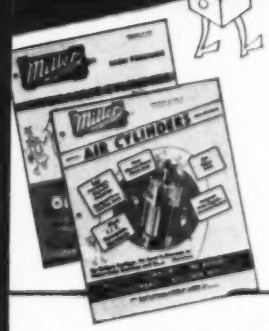
All Delivery Promises Are Dated From Our Receipt of Complete Information At Our Plant.



WRITE FOR CYLINDER BULLETINS A-105 and H-104

Complete Miller cylinder line includes: air cylinders, 1½" to 20" bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.

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steel doubles for brass when lead gets in the act!

INLAND'S *patented*

LEDLOY®...

...now being used to replace brass for

LEDLOY, Inland's lead-bearing steel family, is in shorter supply than ever before. In addition to the increased clamor for LEDLOY in civilian products, the pressure is on for these remarkable free machining steels for use by the military. Today, almost all LEDLOY is going directly into defense production.

Now, LEDLOY replaces scarce brass in projectile parts. It weighs and costs far less and has better physical properties.

The secret of LEDLOY is lead, added to molten open hearth steel by a patented process developed by Inland. Lead does not alter the physical properties of the steel in any way but

here are 4 examples of what LEDLOY® steels have done . . .

Example A: For a three-piece, high-pressure hydraulic fitting requiring severe cold working, LEDLOY Grade A, without any sacrifice in quality, increased production 108% on one part formerly made from C1117. Production rates were increased 41% and 23% on the other two parts originally made from B1113.

Example B: On a gear hob formerly manufactured from B1113, production time with LEDLOY Grade B was reduced 48½% from 7.8 seconds per part to 4 seconds.

Example C: The rate of production on a grease gun part was increased from 265 to 509 . . . a 91% increase . . . when LEDLOY Grade B was substituted for B1113.

Example D: During the Battle of Britain in World War II, one of England's leading steel men, licensed to produce this Inland product in England, became convinced that the machining properties of this new steel could materially help to break the bottleneck in 20 MM shell production. He bet Winston Churchill that using LEDLOY would provide many more shell projectile bodies in less time. To back up this conviction, he made this offer: he would supply 200 tons of LEDLOY on a trial basis. If it didn't work out to everyone's complete satisfaction, he would make no charge for the steel and would also personally donate a Spitfire fighter plane to the war effort. LEDLOY did everything he claimed it would and, since that time, Britain has used LEDLOY almost exclusively for these shell parts.

world's most machinable steel

shell components

does amazing things to the steel's machinability.

The use of LEDLOY steels is a story of faster production, longer tool life and superior surface.

LEDLOY is not a steel of any single analysis but is Inland's registered trade name for any steel made by Inland's special process of adding lead to steel.

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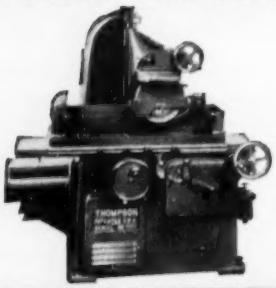
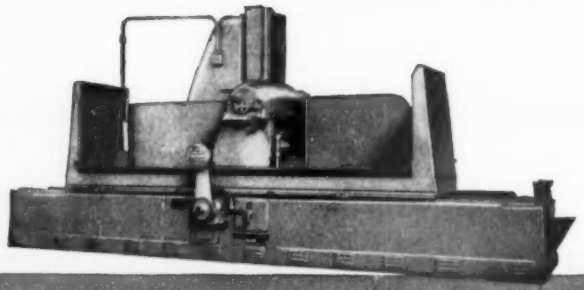
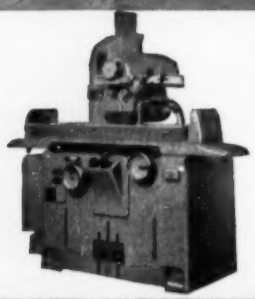


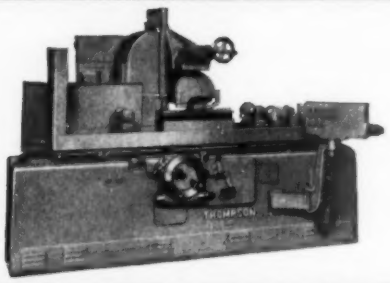
TYPE B Small General Purpose Grinders
sizes from 6x12x16 to 12x12x120



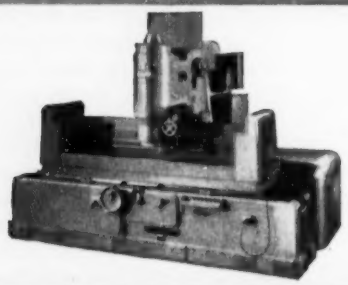
TYPE C & CX Medium and Heavy Duty Grinders
sizes from 12x14x40 to 24x36x240



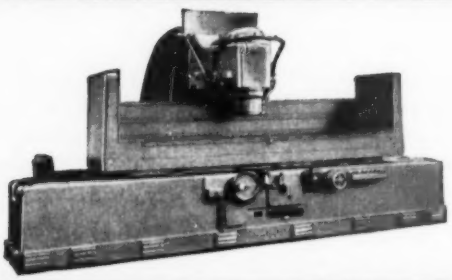
TYPE F Tool Room Grinders available in
sizes 6x10x16 and 8x19x36



TYPE B & C TRUFORM Contour Grinders for all shapes
sizes 12x12x30 to 16x16x50



FIXED COLUMN VERTICAL SPINDLE Production Surface Grinders
sizes 12x36x60 to 36x96x150



SLIDING COLUMN VERTICAL HYDROVERT For ... precision on small-level surfaces
sizes 14x24x46 to 40x84x192

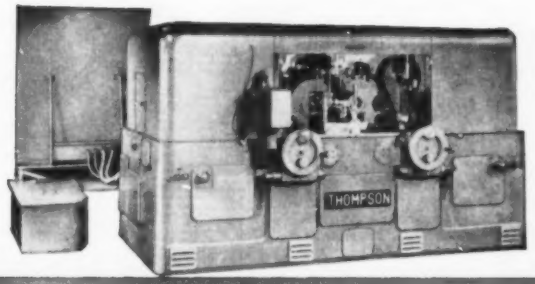
Write Thompson today for details ...

1 **WIDEST RANGE** of light and heavy duty Surface and Contour Grinders

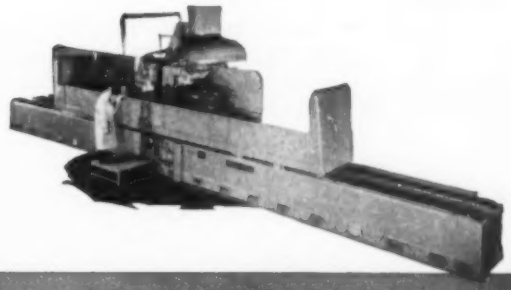
2 **HIGHEST ACCURACY** for lower costs

3 **PROVED QUALITY** for longer service

4 **SPECIAL MACHINES** for any surface and contour grinding application

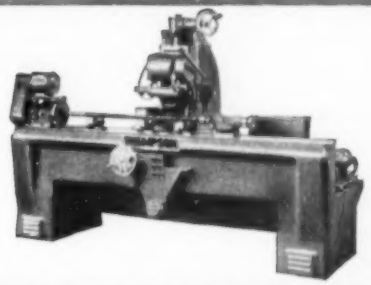


DOUBLE WHEEL BUCKET AND BLADE GRINDER for jet aircraft

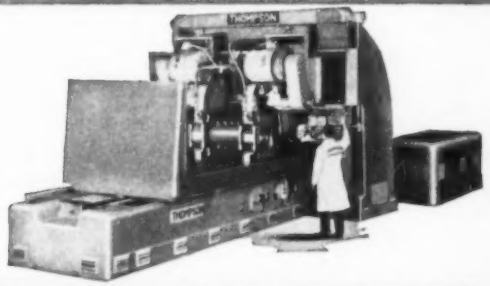


WAY GRINDERS Many sizes and types from 10x11x48 to 50x50x240

TWIN CHUCK ROTARY GRINDER For grinding circular metal discs 6 to 12 inch and 6 to 24 inch discs



NEW SERIES 600 MANUAL BROACH GRINDER sizes from to



RAIL TYPE HYDRAIL Widest grinder ever built sizes 48x36x96 to 78x36x360

Thompson SURFACE Grinders

The Thompson Grinder Co., Springfield 1, Ohio

SWANSON

V-LINER (PATENTED) INSPECTION UNIT

A new, universal inspection device which integrates all of the normal requirements of the Inspection Department

Saves

space, man-hours, tool investment.

BASIC UNIT INCLUDES: (1) a 60" surface plate; (2) an exclusive, concentricity checking attachment; (3) adjustable bench centers; (4) V-blocks; (5) sine plate; (6) indicator attachment. All are self-aligning and quickly adjustable or removable. Specifications and tolerances meet finest precision standards. Savings in space, man-hours and tool investment are substantial.

Write for Bulletin V-1

The V-Liner Inspection Unit incorporates, all of the skill, precision and experience gained by Swanson in more than a third of a century of designing and building special automatic machines. Swanson machines have reduced costs, increased output and improved precision in hundreds of manufacturing operations.

. . . other PRECISION PRODUCTS by SWANSON

V-Liner Concentricity Checking Fixtures
V-Liner Holding Fixtures
Turret Index Units
Memory Devices for Automatic Machines
Feeding Hoppers and Positioning Devices
Filling Machines

Engineers and builders of special, precision machinery

SWANSON
TOOL & MACHINE PRODUCTS INC., ERIE, PA.

Quality since 1919

DO YOU HAVE "SPECIALS" PROBLEMS

Polished, spherical head hardened to Rockwell C-64. Balance of screw hardened to Rockwell C-40.

Screw body continuous threaded, cross-drilled, and rifle-drilled for oil passages.

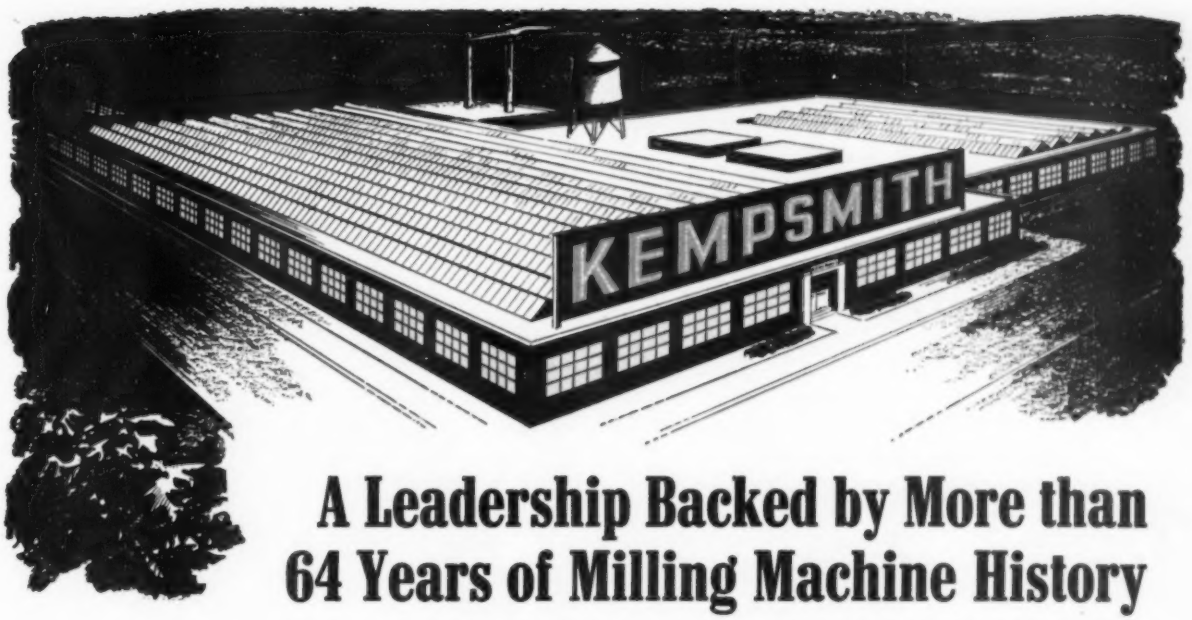
Base machined for socket-head installation and adjustment. All measurements held to specifications.

When you run into screw requirements like this special part, you can rely on Mac-it to produce it for you—**exactly to your specifications!**

One of the major requirements of this special part was that it possess two different degrees of Rockwell hardness—Rockwell C-64 for the spherical head, and Rockwell C-40 for the balance of the screw. This problem was readily solved with Mac-it "selective" hardening processes. The screw body was cross-drilled and rifle-drilled for oil passages. All measurements were held to very close tolerances, and the base was machined for socket-head installation and adjustment.

The resulting Mac-it screw met all specifications exactly—typical of all Mac-it products. When you need special screws, call or write your nearest Mac-it distributor or the Main Office, Cleveland, Ohio.

MAC-IT SCREW DEPARTMENT
STRONG, CARLISLE & HAMMOND COMPANY
1392 W. 3RD. STREET • CLEVELAND 13, OHIO
Manufactured by Mac-it Parts Co., Lancaster, Pa.



A Leadership Backed by More than 64 Years of Milling Machine History

Back in 1888, Kempsmith Engineers developed and produced the first Kempsmith Miller — a machine that was destined to achieve world-wide fame. The successful performance of this early model encouraged important engineering improvements and refinements resulting in much greater speed and precision in milling operations. Today, Kempsmith continues as a leader in the industry. The ruggedness, precision and ability to take heavy cuts smoothly make Kempsmith Milling Machines ideal for production, toolroom or general purpose milling. If you have a milling problem, consult Kempsmith. Our engineers will gladly give you the benefit of their broad experience in this specialized field.

THE KEMPSMITH MACHINE CO.
MILWAUKEE 14, WISCONSIN, U. S. A.

Kempsmith Type "G" Plain Miller. All geared for positive power and smooth cutting, free from chatter. Note rugged, streamlined appearance. All controls are grouped within easy reach of the operator. Available in No. 1, 2 and 3 sizes, plain and universal models.

Let the chips fly! Kempsmith Millers have what it takes for tough production battles — built-in ruggedness, increased range of speeds and feeds, greater power. Every machine is precision-built, the product of 64 years of milling machine experience.

KEMPSMITH

• Precision Built Milling Machines Since 1888 •

A-7270-1PC

BAY STATE MOUNTED POINTS and WHEELS

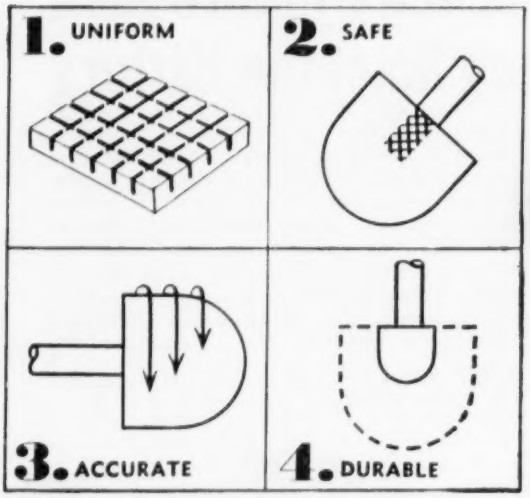
INDICATOR ACCURACY

Best because:

Precision Shaped

on the spindle for perfect contour and complete concentricity.

You get . . .
UNIFORM, SAFE, PRECISE PRODUCTION



1. Made from solid blocks of perfectly mixed materials.
Result: Complete elimination of "hard and soft" spots.

2. Deep-knurled, high strength alloy steel spindles, and special adhesive.
Result: Abrasive heads stay on spindles.

3. Each wheel trued and shaped after mounting on its spindle.
Result: Perfectly concentric; ready to use when you get it.

4. Completely uniform structure; pretested, positive bonding.
Result: Longer useful life; use them right down to the spindle.

Deep-Knurling

for EXTRA SAFETY, in high-strength alloy steel spindles. THE HEADS STAY ON!

Specially Cemented

USE THEM . . . right down to the spindle!

Wrench-and-vise test proves its strength. This cement HOLDS, under EXTREME STRAIN.

BAY STATE

WIDE RANGE OF SHAPES & SPECIFICATIONS AVAILABLE FOR IMMEDIATE SHIPMENT

SEND FOR CATALOG

BAY STATE ABRASIVE PRODUCTS CO.
Westboro, Massachusetts, U. S. A.

Branch Offices and Warehouses:
Chicago, Cleveland, Detroit, Pittsburgh
Distributors — All Principal Cities
In Canada: Bay State Abrasive Products Co. (Canada)

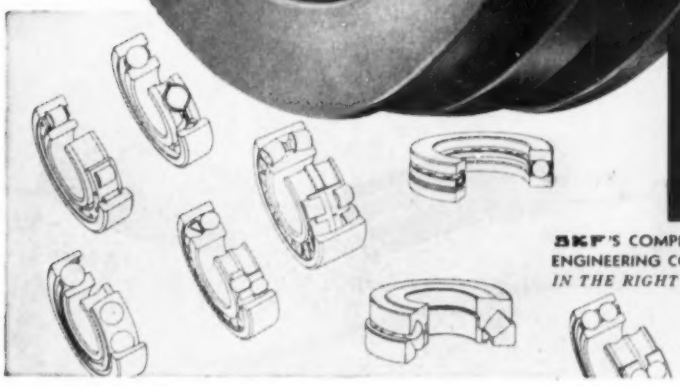
Here's why SKF Triple-Seal "SAF" Pillow Blocks are your solution:

- SKF Triple-Seal "SAF" Pillow Blocks are easy to install and inspect.
- The Triple-Seal rotating rings provide effective sealing from dirt; retains any kind of lubricant.
- The bearings are self-aligning.
- Available with ball bearings or spherical roller bearings, free or held . . . for either adapter mounting or direct mounting of bearing on shaft.

When you have a bearing replacement to make, call your SKF Distributor. He'll show you *why* you will minimize bearing trouble with SKF Triple-Seal "SAF" Pillow Blocks. Remember—your SKF Distributor is a bearing *specialist*.

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.,— *manufacturers of* **SKF** *and* HESS-BRIGHT *bearings.*

7384-A



SKF®

BALL AND ROLLER BEARINGS

SKF'S COMPLETE LINE OF ANTI-FRICTION BEARINGS, PLUS **SKF** ENGINEERING CO-OPERATION, HELPS YOU PUT *THE RIGHT BEARING IN THE RIGHT PLACE.*

Design Around

BOSTON GEAR CATALOG

Lists all gears and other BOSTON Products. Contains time-saving information on gear selection and useful reference data. Ask your Boston Gear Distributor . . . . or write: Boston Gear Works, 60 Hayward Street, Quincy 71, Mass.

Put this **STAMP OF APPROVAL** of 250,000 users on your product.

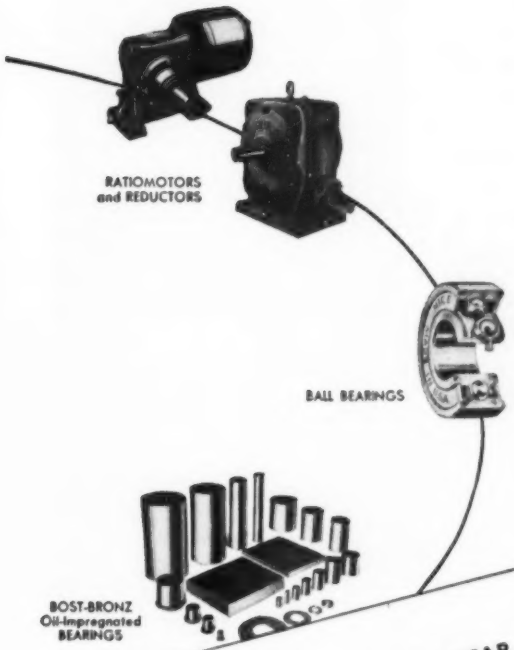
EQUIPPED WITH BOSTON Gear Standardized Products

BOSTON Gear®

STANDARD STOCK GEARS

and other

POWER TRANSMISSION EQUIPMENT



At Authorized BOSTON GEAR DISTRIBUTORS — a

$10,000,000

stock of BOSTON Gears and other BOSTON Products is ready to fill your orders promptly

for LOWER COST

Compare your gear-cutting costs with cost of precision-made, completely interchangeable BOSTON Standard Stock Gears. You'll find it pays to design around BOSTON.

for WIDEST SELECTION

The BOSTON Catalog lists over 2000 types and sizes of gears . . . and a full range in the many other BOSTON Power Transmission Products.

for PROVED QUALITY

There's no "gamble" when you add BOSTON to your purchasing specifications. BOSTON quality has remained the industry's standard for 75 years. That's why BOSTON products are first choice of more than 250,000 cost-wise industrial buyers.

for NEARBY STOCKS

These BOSTON Products are available from 80 of the nation's top-rated, most experienced Industrial Distributors. When it's BOSTON equipped, the machine you make is only minutes away from a reliable source of repair parts.

GET THE "BEST BUY" . . . GET IT FASTER

Let **BOSTON** *be your "buy-word"*

QUICKER DELIVERY
Our vastly increased production facilities mean quickest deliveries in the industry.

HIGHEST QUALITY
Constant research and improvement make these wheels the world's finest.

at competitive prices

Quality controlled
RESINOID BONDED WHEELS
for continuous fine performance

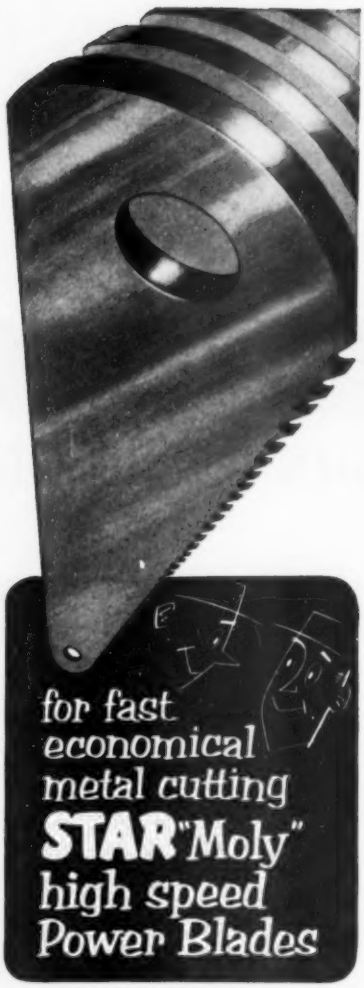
. . . rapid stock removal . . . no carbide ruined by heat checks . . . perfect "spark-out" on large diameter cutters . . . keen cutting edges . . . maximum economy in terms of carbide removed per dollar of wheel cost.

Continuous research and improved manufacturing methods have resulted in the finest Diamond Wheels for production maintenance of all carbide cutting tools, milling cutters, dies, etc.

Model CH-105 Carbide Tool Grinder gives the low tool maintenance cost small shops demand and large plants need. Equipped for wet grinding. 9000 RPM spindle gives higher surface speed to smaller, less expensive wheels making them cut much faster and perform more efficiently.

UNITED STATES DIAMOND WHEEL COMPANY
AURORA, ILLINOIS

"American made for American industry"



for fast economical metal cutting
STAR "Moly" high speed Power Blades

For over 70 years, industry has preferred STAR quality, preferred the blades made of carefully heat-treated, top-quality steel, fabricated on specially designed equipment—all for the sole purpose of delivering fast, economical metal cutting and long blade life.

FOR FAST, ECONOMICAL
Service

STAR Blades are sold only through recognized distributors. You get *fast* service from local distributors' inventories. You get *economical* service because your distributor knows your operations best, he is easy to reach, he is trained by qualified factory representatives to know the answers to your metal cutting—and hundreds of other—problems.

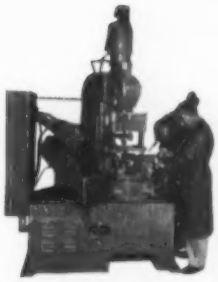
CLEMSON BROS., Inc.
MIDDLETOWN, N. Y., U.S.A.
Makers of Hand and Power Hack Saw Blades, Frames, Metal Cutting Band Saw Blades and Clemson Lawn Machines.

From the *American Machinist* Library of Tips for Top Shop Men

SABOTAGE is a greater potential danger for most plants than bombing. Have you taken any precautions to guard against it?

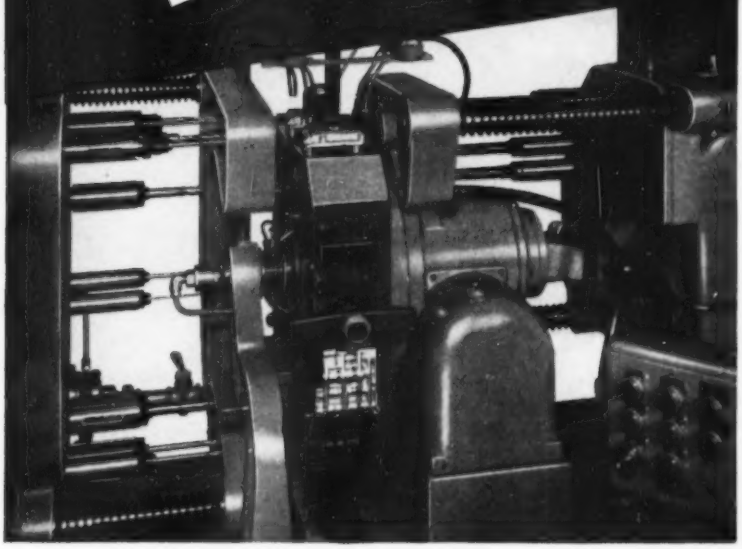
MORALE isn't built in a crisis; it's built beforehand. The crisis only tests it.

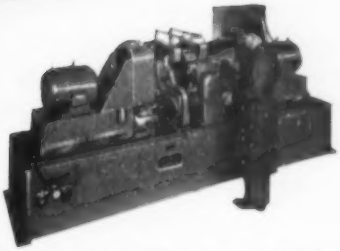
THERE'S an old saying that "If you want to be big, you've got to look big." Nobody likes a fourflusher or a fop, but everybody has been trained from childhood to expect a leader to look like one. Company policy can't earn respect on the major things either, if it is small on the minor things. Don't make your company look small.



Closeup at the left shows a six station Hartford Automatic single purpose machine rough and finish reaming two cored holes, plus drilling two holes at different angles in die cast aluminum housings.

The LOWDOWN on HIGH PRODUCTION





This view shows a four station Hartford vertical dial type machine drilling, coredrilling and counterboring five holes in aluminum valve bodies.

Hartford Special is ready to design and build a special purpose drilling and tapping machine to boost your production, too. Why not write for more information.

When it comes to production –

HARTFORD *Special*

SUPER-SPACERS

Automatic THREAD ROLLERS

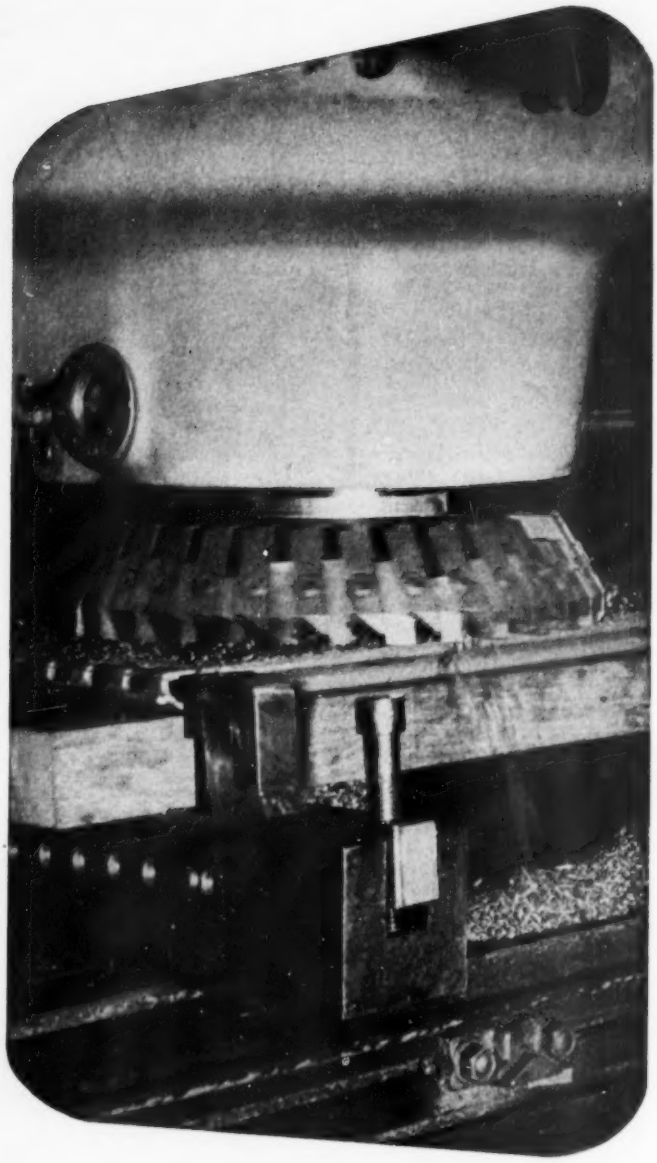
THE HARTFORD SPECIAL MACHINERY CO., HARTFORD 12, CONN.

A WEEK'S FINISHING DONE IN A DAY

HAYNES STELLITE alloy milling cutter blades recently solved a tough finishing problem in the production of cast iron mold jackets. Face-milling operations with harder tool materials failed because of chipping and spalling of the cutter blades after finishing only a few castings. Then the foundry tried grinding the jackets. But this was too slow; it took at least 30 minutes to grind each one.

A switch to HAYNES STELLITE Star J-Metal blades cut finishing time to a mere six minutes per casting. An extra saving results from the long life of the HAYNES STELLITE alloy blades. They produce about 350 pieces per grind.

HAYNES STELLITE alloy tools are ideal for cast iron milling jobs because of their high compressive strength at cutting temperatures, good impact strength, and extremely low coefficient of friction. Contact our nearest District Office for on-the-job help with your machining problems, or write for the new manual, "HAYNES STELLITE Metal-Cutting Tools."



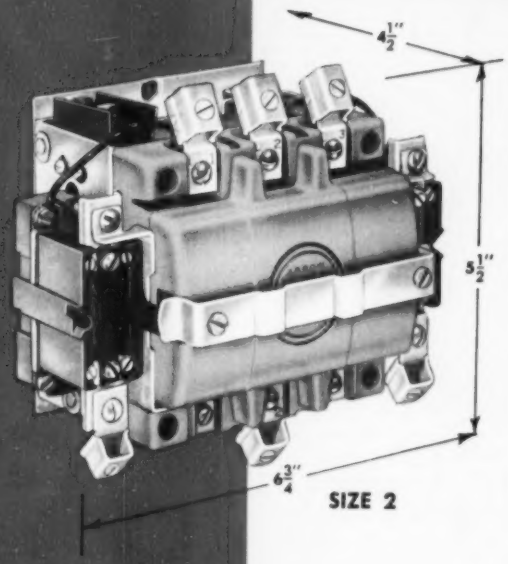
This 12-in. diameter cutter, containing 32 HAYNES STELLITE alloy inserted blades, removes 1/16-in. of stock from cast iron mold jackets. A 36-in. casting is milled with this setup in about 1/5 the time required for grinding.

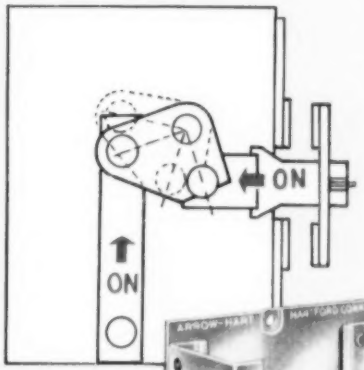
HAYNES TRADE-MARK *alloys*

Haynes Stellite Company
A Division of
Union Carbide and Carbon Corporation
UCC
General Offices and Works, Kokomo, Indiana
Sales Offices
Chicago — Cleveland — Detroit — Houston
Los Angeles — New York — San Francisco — Tulsa

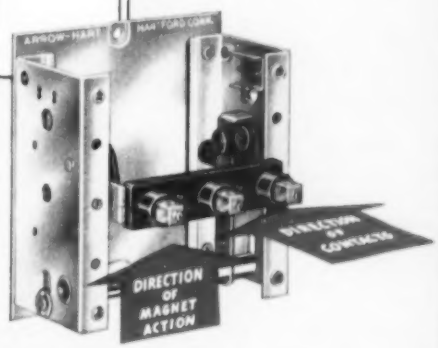
"Haynes" and "Haynes Stellite" are trade-marks of Union Carbide and Carbon Corporation.

HERE'S THE BIG STORY BEHIND ARROW-HART'S DEVELOPMENT OF THE TYPE "RA" MOTOR CONTROL DESIGN





Balanced mechanism features knee-action bell-crank fulcrum design to transfer action from vertical to horizontal plane. Action multiplies leverage — increases contact pressure.



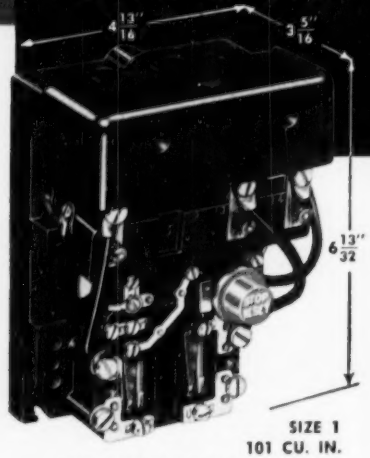
JUST 1/2 THE SIZE

ARROW AH HART

A REVOLUTIONARY DESIGN
THOROUGHLY TESTED AND PROVED TO
PROVIDE SUPERIOR OPERATING PERFORMANCE
IN HALF THE SPACE • WITH LESS WEIGHT

PROGRESS IN DESIGN MAKES THE **BIG** DIFFERENCE

HERE ARE THE FACTS OF THE ARROW·HART ADVANCEMENT OF *Magnetic* MOTOR CONTROLS



SIZE 1
101 CU. IN.

ARROW-HART'S 1930
CLAPPER TYPE STARTER

COMPACTNESS
Much wasted space; contacts over magnet . . . overload relays below.

UNDERVOLTAGE RELEASE
POOR — dependent on gravity working through an inefficient linkage angle.

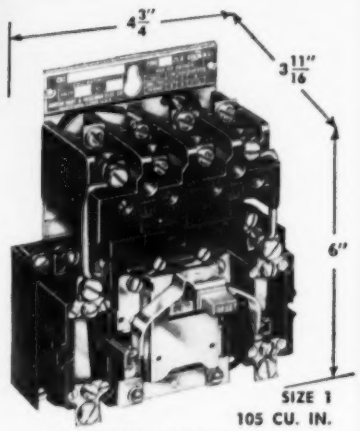
CONTACTS
Single break type.

AUXILIARY ELECTRICAL INTERLOCKS
Available, but could not be added conveniently.

CONTACT ALIGNMENT
No positive guidance, no sure alignment.

WIRING
"Scrambled Wiring" with load terminal on line side and crossing circuits. Difficult to wire and lacking the safety factor of circuit separation.

ARC SUPPRESSION
FAIR but lacking complete separation of arcing chambers. Hood and base of Bakelite — best material available *then*.



SIZE 1
105 CU. IN.

ARROW-HART'S 1940
DIRECT-ACTING SOLENOID TYPE STARTER

COMPACTNESS
Some improvement, but still far from ideal.

UNDERVOLTAGE RELEASE
Still entirely dependent on gravity, but now more efficiently applied.

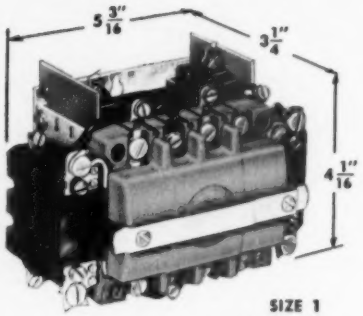
CONTACTS
Double break type.

AUXILIARY ELECTRICAL INTERLOCKS
Available, but could not be added conveniently.

CONTACT ALIGNMENT
No positive guidance, no sure alignment.

WIRING
"Scrambled Wiring" with load terminal on line side and crossing circuits. Difficult to wire and lacking the safety factor of circuit separation.

ARC SUPPRESSION
FAIR but lacking complete separation of arcing chambers. Hood and base of Bakelite — best material available *then*.



SIZE 1
66 CU. IN.

AND IN 1950
THE EXCLUSIVE ARROW-HART "RIGHT ANGLE" DESIGN

JUST 1/2 the SIZE and WEIGHT of any other control on the market.

UNDERVOLTAGE RELEASE
Positive and independent of gravity. Able to operate properly in any position — even upside down.

CONTACTS
Double break type PLUS greater accessibility for easy inspection or replacement.

AUXILIARY ELECTRICAL INTERLOCKS
Easily and conveniently added to provide added utility. Available N. O., N. C. and N. O. — N. C.

CONTACT ALIGNMENT
Contact movement is positively guided through its entire travel. Exact alignment is assured at all times.

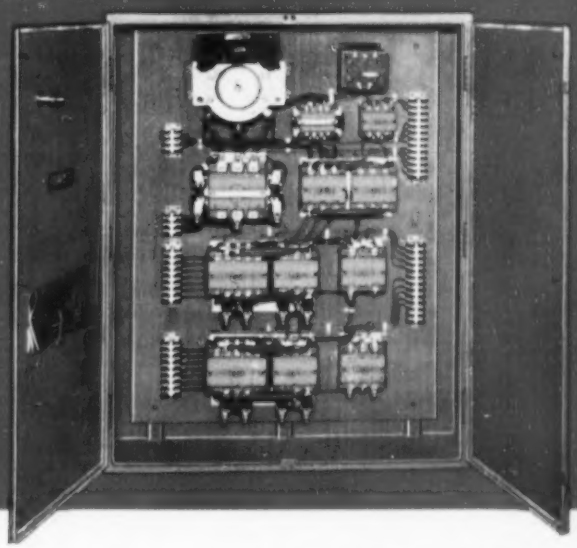
WIRING
In-built STRAIGHT-THRU WIRING without the use of bus-bars. Fast and easy to wire; circuits safely separated.

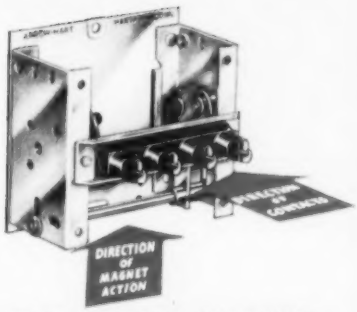
ARC SUPPRESSION
EXCELLENT — Individual arcing chambers completely isolated. Hood and base of alkyd plastic that resists arcing and tracking more than 50% better than next best material.

YOUR ELECTRICALLY OPERATED EQUIPMENT *Demands* MODERN MOTOR CONTROLS

ARROW AH HART

"RIGHT ANGLE" DESIGN *Motor Control Line* IS THE MOST ADVANCED LINE AVAILABLE ANYWHERE





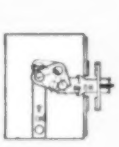
"RA" PRINCIPLE ACCOUNTS FOR SMALL SIZE

PLUS SUPERIOR PERFORMANCE

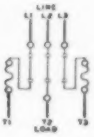
POSITIVE RELEASE ACTION IN ANY POSITION

RUGGED CONTACTS

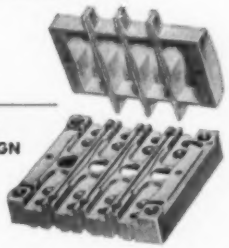
AUXILIARY ELECTRICAL INTERLOCK



GUIDED CONTACT TRAVEL



SIMPLE TO WIRE EASY TO TRACE



TONGUE AND GROOVE DESIGN

INSIST ON MOTOR CONTROLS THAT HAVE KEPT PACE WITH OTHER INDUSTRIAL DEVELOPMENTS

In a recent 10 year period, lathes, for example, were improved in 43 separate categories, many of which resulted in time savings of 200 to 300% for the performance of a specific operation. Don't handicap your machines and equipment with 1930 controls. Specify Arrow-Hart "RA" Controls and be assured of full rated performance.

THE "RIGHT ANGLE" OPERATING MECHANISM, an exclusive Arrow-Hart feature, represents the first real advance in motor control design since the introduction of the original solenoid type. This revolutionary new concept makes it possible to build superior performance and added working advantages into a control just ½ the size and weight of any other now on the market. The time-tested bellcrank principle is utilized to produce a mechanical advantage that enables a small, compact magnet to outperform the old fashioned, direct-acting type. Action is transferred from a vertical to a horizontal plane — less weight is wastefully lifted against gravity. Operating efficiency, dependability and service life are greatly increased. Other important refinements such as Straight-Thru Wiring, guided parallel closure of contacts for superior alignment, and easily attached Auxiliary Electrical Interlocks are made possible by the space-saving simplicity of this design.

THERE'S AN ARROW-HART "RIGHT ANGLE" MOTOR CONTROL FOR EVERY APPLICATION

Regular, Reversing and Multi-Speed Starters are available in Sizes 0, 1, 2, 3, 4, 5. — Contactors in Sizes 00, 0, 1, 2, 3, 4, 5. NEMA Type enclosures can be supplied for general service and for use in hazardous and exposed locations.

SEND FOR LITERATURE COMPLETE WITH RATINGS, DIMENSIONS, WEIGHTS and ENGINEERING DATA.

INDUSTRIAL CONTROL DIVISION

THE ARROW-HART & HEGEMAN ELECTRIC CO.

103 Hawthorn St., Hartford 6, Conn., U.S.A.

ARROW AH HART

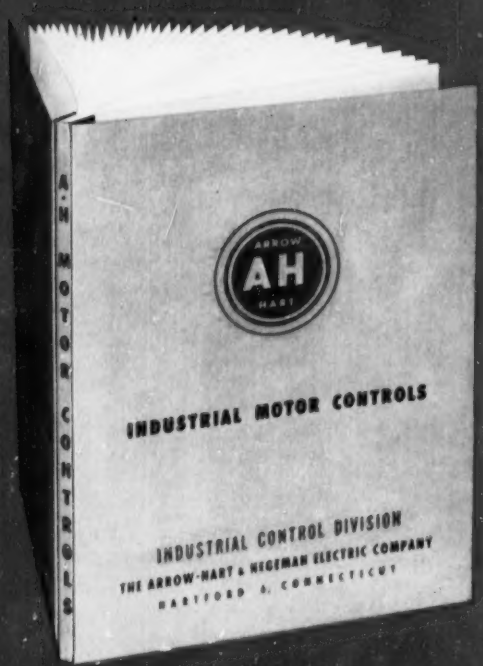
HERE'S IMPORTANT INFORMATION

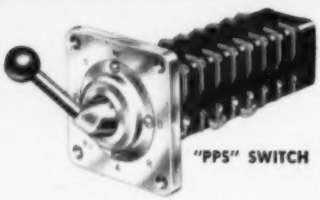
FOR

DESIGN ENGINEERS
PLANT MANAGEMENT
PURCHASING AGENTS
ELECTRICIANS
MANUFACTURERS
and EVERY OTHER USER OF
INDUSTRIAL MOTOR CONTROLS

Here is the ALL-NEW Arrow-Hart Motor Control Catalog with full information on the entire A-H line. All of the controls shown below—and many more types—are included. General description and application sections are supplemented by complete engineering data including ratings, weights and dimensions, and wiring diagrams. Additional sections will be issued to cover all new models or modifications as they are made available. A handy ordering sheet and price supplement accompanies the catalog.

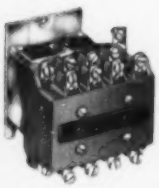
Whatever your requirement, there is an Arrow-Hart motor control complete with auxiliary equipment designed and built to do the job — and do it better. It's easy to find the right unit to do YOUR job in the A-H Catalog. Send for your copy today.

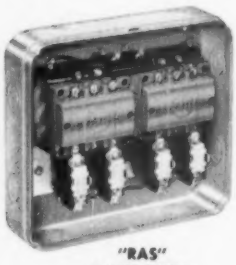



"PPS" SWITCH

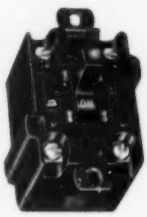
PUSH BUTTON CONTROLS

"NF" MANUAL STARTER


"OO" CONTACTOR


"RAS" MULTI-SPEED STARTER

EXPLO-SAFE STARTER


LOAD-LIMIT SWITCH

"NT" MANUAL STARTER

THE ARROW-HART & HEGEMAN ELECTRIC COMPANY
103 HAWTHORN STREET, HARTFORD 6, CONNECTICUT

Please send my free copy of the catalog, "INDUSTRIAL MOTOR CONTROLS"; I am particularly interested in the following type(s) of equipment:_____

NAME_____

POSITION_____

CO. NAME_____

CO. ADDRESS_____

CITY_____ ZONE____ STATE_____

ARROW·HART

INDUSTRIAL CONTROL DIVISION

THE ARROW-HART & HEGEMAN ELECTRIC COMPANY
HARTFORD 6, CONNECTICUT

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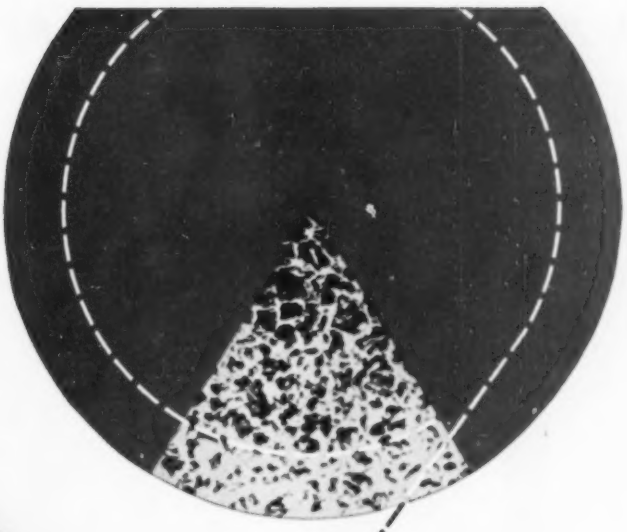
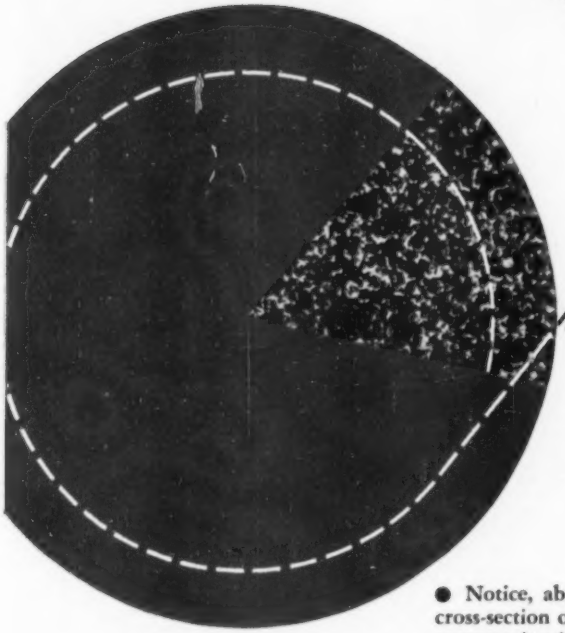


The "decarb" (light-colored) area in the ordinary heat-treated bar at right must usually be removed before parts can be made from the stock.



Notice that this Republic carbon corrected alloy steel bar has had full carbon content restored to outer edges by carbon correction.

HERE IS WHERE Republic Carbon-Corrected Alloy Steel Bars help you make a profit

● Notice, above at the right, the "decarb" area in the outer edge of the cross-section of a cold drawn alloy steel bar as ordinarily heat treated. Then compare it with the cross-section below at the left. Notice how the carbon has been restored by carbon correction even to the extreme outer circumference.

Here, in the outer rim of Republic Carbon-Corrected Alloy Steel Bars, is the profit-area for your machine tools . . . the part of the bar you don't have to machine away into chips and shavings.

Let our Republic 3-Dimension Metallurgical Service work with your metallurgists and production men to adapt Republic Carbon-Corrected Cold Drawn Alloy Steel Bars to your products. Your Republic Steel salesman can arrange for the Republic Field Metallurgist to call at your convenience.

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

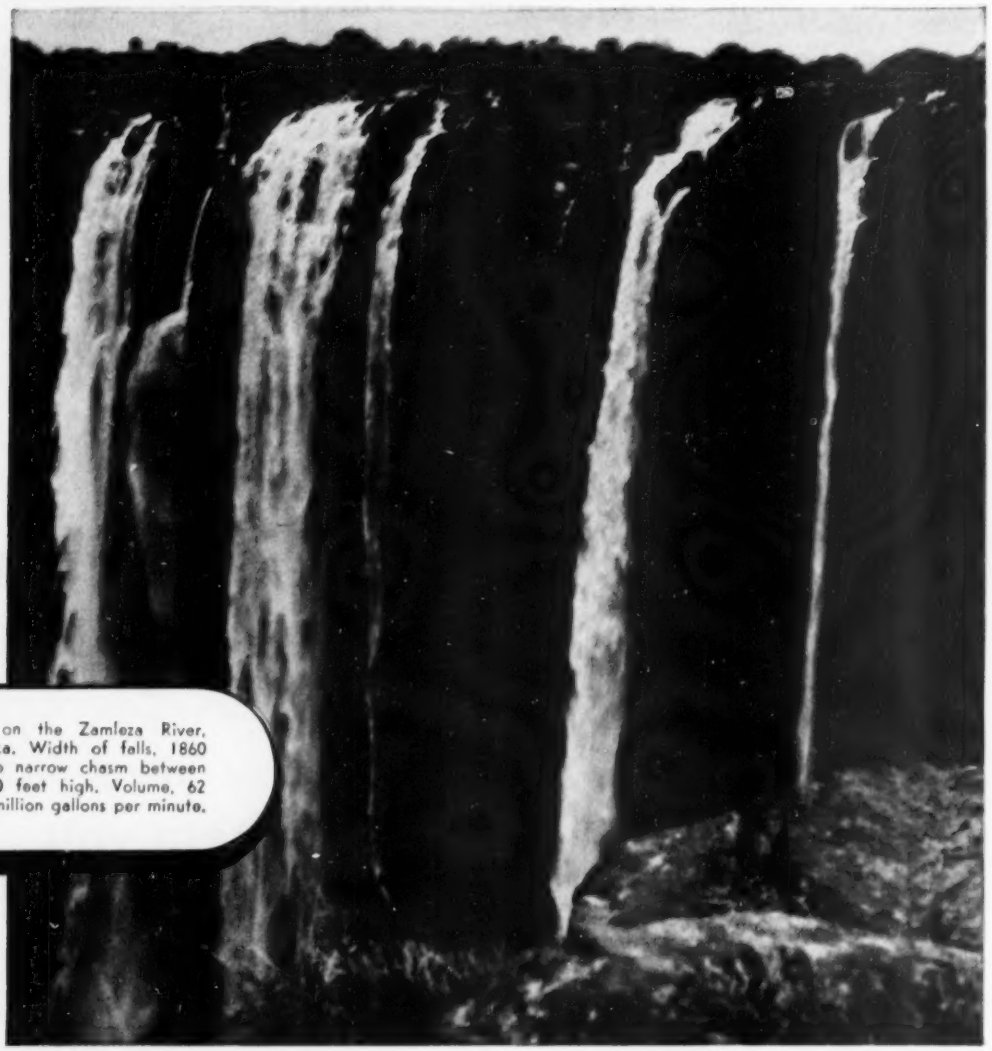
LAB FIELD MILL

3-DIMENSION Metallurgical Service

. . . combines the extensive experience and coordinated abilities of Republic's *Field, Mill* and *Laboratory* Metallurgists with the knowledge and skills of your own engineers. It has helped guide users of Alloy Steels in countless industries to the correct steel and its most efficient usage. IT CAN DO THE SAME FOR YOU.

Republic COLD DRAWN
REPUBLIC STEEL
ALLOY STEEL BARS

LOGAN FLUID POWER • DURABLE, DEPENDABLE SINCE 1916



Victoria Falls on the Zamleza River, Rhodesia, Africa. Width of falls, 1860 feet. Spills into narrow chasm between sheer walls 400 feet high. Volume, 62 million to 100 million gallons per minute.

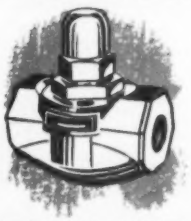
Illustrated, Model 4095—4-way, 2-position valve for directing pressure alternately to ends of double-acting hydraulic cylinder.

LOGAN HYDRAULIC CONTROL VALVES

A broad range of types and sizes to most effectively meet any requirement—Design Engineers, Machine Operators, Maintenance Men appreciate these Logan advantages

- LONG-LIFE CONSTRUCTION
- EASY TO SERVICE
- INFREQUENT MAINTENANCE
- EASE OF INSTALLATION
- EFFORTLESS OPERATION
- UNRESTRICTED PORTING

Let Logan Engineers help you design your Air and Hydraulic Circuits



Illustrated, Model 8015 adjustable speed control valve. Install between operating valve and one end of cylinder to meter flow of oil in one direction with free flow on return.

LOGAN MANUFACTURES 6,975 STANDARD CATALOGED ITEMS

FREE CATALOG ON REQUEST

AIR CONTROL VALVES, Cat. 100-4 • AIR CHUCKS, Cat. 70-1 • AIR CYLINDERS, Cat. 100-1 • AIR-DRAULIC CYLINDERS, Cat. 100-3
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SAVES TIME — Logan — AIR AND HYDRAULIC EQUIPMENT — EFFORT • MOTION

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Yes! Here is one of the nation's outstanding engineering departments ready to go to work for you!

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If your production equipment is slow, inefficient, old and expensive-to-operate, and you would like the finest in modern, high-speed, labor-saving machinery for leveling, processing, bending, forming, cold drawing, coiling, cutting, or feeding of **steel and non-ferrous metals**, put this top-flight, problem-solving crew to work for you now. Just call or write

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METAL-WORKING MACHINERY

WHEN IT COMES TO . . .

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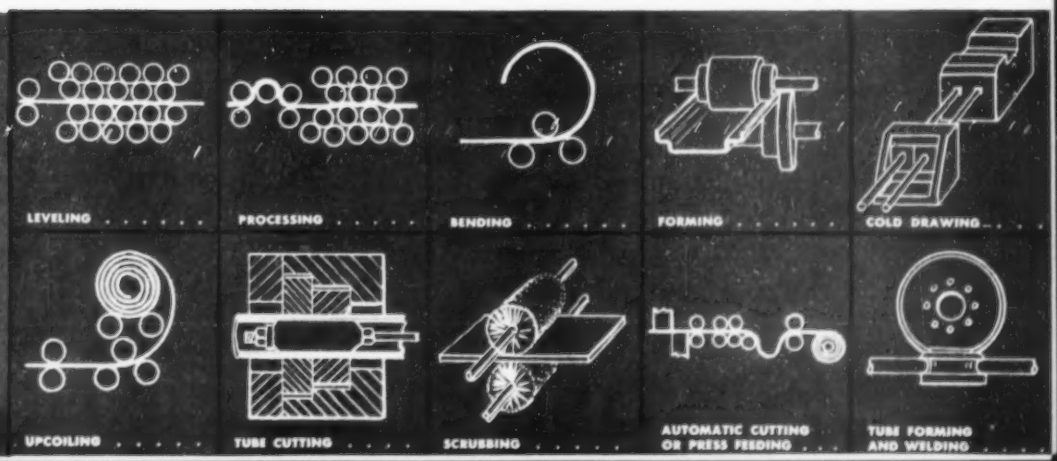

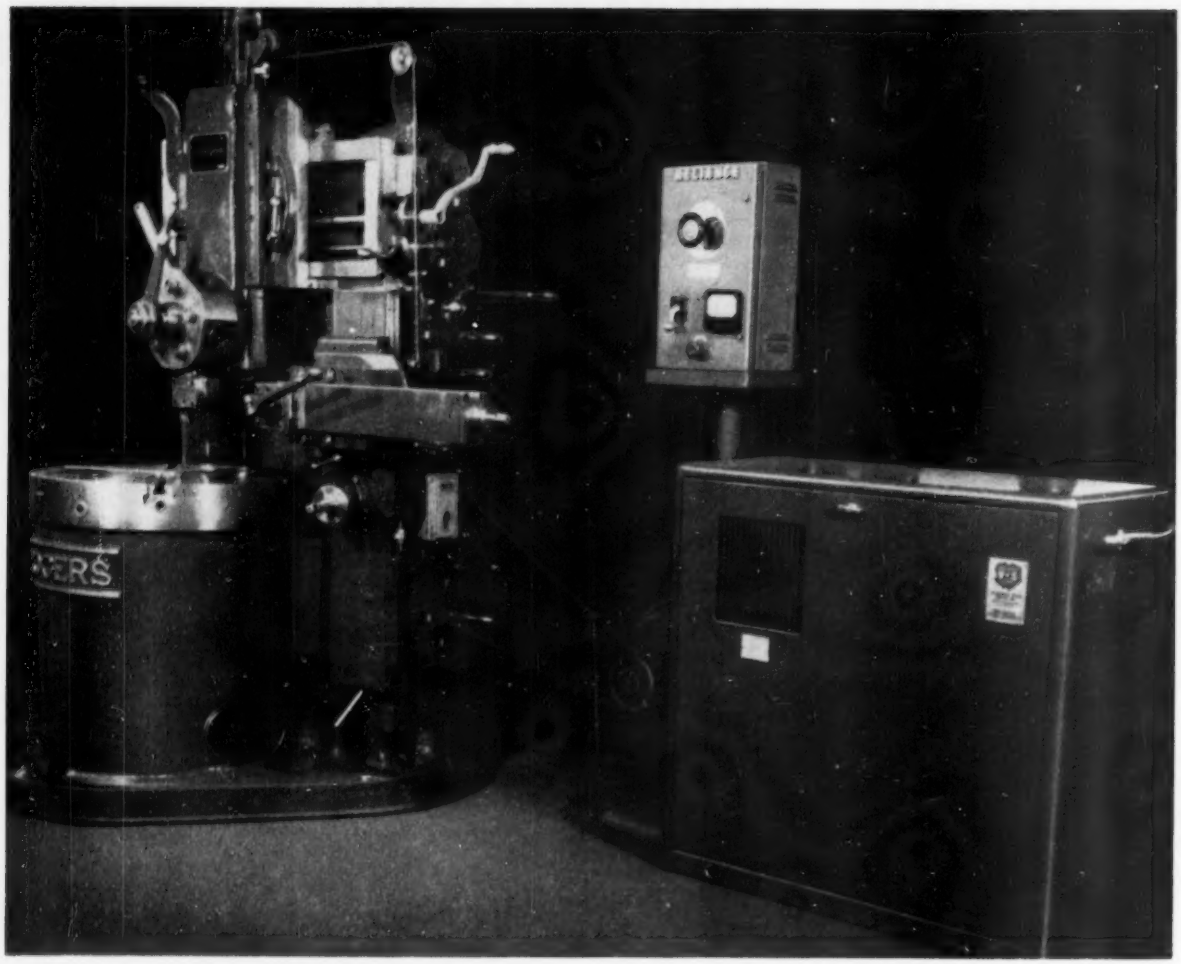

Announcing

NEW ADJUSTABLE SPEED DRIVE on *Rogers* "perfect 36" VERTICAL TURRET MILLS

STANDARD ROGERS
"PERFECT 36" VERTICAL TURRET MILLS FOR BORING, DRILLING, TURNING AND THREADING AVAILABLE AT SURPRISINGLY LOW PRICES.

Unlimited table speeds up to 212 R.P.M. are provided by this new Rogers Adjustable Speed Drive. In addition to setting motor speeds, this new drive eliminates the 8 speed transmission, clutch, brake and lever controls from the standard Rogers "Perfect 36" Vertical Turret Mills.

Rogers speed control box, independent to permit locating for operator's convenience, is equipped with rheostat control, and start, stop and jog push buttons.

Write TODAY for complete information and surprisingly low costs.

ROGERS MACHINE WORKS

KNOWING HOW SINCE 1885

1400 SENECA STREET **BUFFALO 10, N.Y.**

CUT COSTS

with the Original Mead

MIDGET AIR CLAMP

(Spring Return Air Cylinder)

In assembly jigs and other multiple applications, this new, low cost pressure unit saves countless man-hours. As a work-ejector in many fixtures, it is unexcelled.

Advantages over mechanical clamps

1 **All Air Clamps** in any set-up can be operated by a single master valve—the "lock-up" and release of assemblies is instantaneous.

2 **May be installed in cramped corners** difficult to reach with bulky mechanical clamps. Mead Midget is the most compact air cylinder, for its power, on the market.

3 **Equal ram pressure at any point** along stroke, making special, delicate adjustments unnecessary.

4 **Independent group control.** Any desired group of "Midgets" can be controlled independently of any other group in an assembly—as where primary members of the fixture must be locked up before the secondary members.

5 **Facilitates delicate drill operations.** Air Clamps actuated by foot control valves leave operator's hands free to handle the work pieces.

Send for all the interesting facts on these time-tested, superior Midget Air Clamps.

MEAD SPECIALTIES COMPANY

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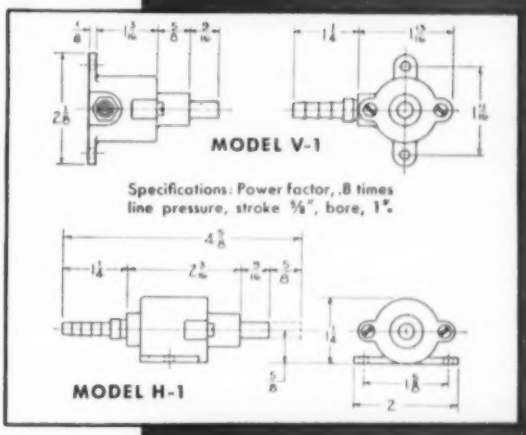

IMMEDIATE DELIVERY

Single-acting cylinders delivered from stock; double-acting in a few days.

***New* MEAD INDUSTRIAL AIR POWER CATALOG**

MEAD

Air Operated Devices

Memo Coupon

MEAD SPECIALTIES CO.

4114 N. Knox Ave., DEPT. MA-43, Chicago 41, Ill.

Send free copy of new, colored MEAD INDUSTRIAL AIR POWER CATALOG describing the complete line of famous Mead air-operated devices.

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Company_____

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MAXITORQ *automatic*

OVERLOAD RELEASE

CLUTCH

To designers and manufacturers of high-speed automatic machinery, Carlyle Johnson offers practical engineering recommendations for applications of this protective power transmission unit.

Let's consider, for instance, a can or bottle labeling machine . . . when an accidental overload shock occurs. Labels go flying all over the place, cans or bottles gang up and are dented or broken, the driving mechanism is jammed . . . and all that costs money and down-time.

But not if your original power transmission is controlled by the Maxitorq automatic Overload Release Clutch, which is manually adjusted to transmit the normal running load and instantly disengages into neutral when the overload strikes. With a minimum of clean-up, the clutch is re-engaged . . . and all is well.

Overload Release Cups (note the cam construction) are the means by which the clutch is connected to the driven or driving member. We make them at relatively low cost . . . and can also supply hub, ring, flange, or cut-off coupling types to suit your specific conditions. Clutches standardized in 6 sizes, ¼ to 5 H.P. @ 100 r.p.m.; working torque, 13 to 263 ft. lbs.

Send for Bulletin #150—AM-4

THE CARLYLE JOHNSON MACHINE CO.

MANCHESTER . . . . . CONNECTICUT

SCJ53

Frankly

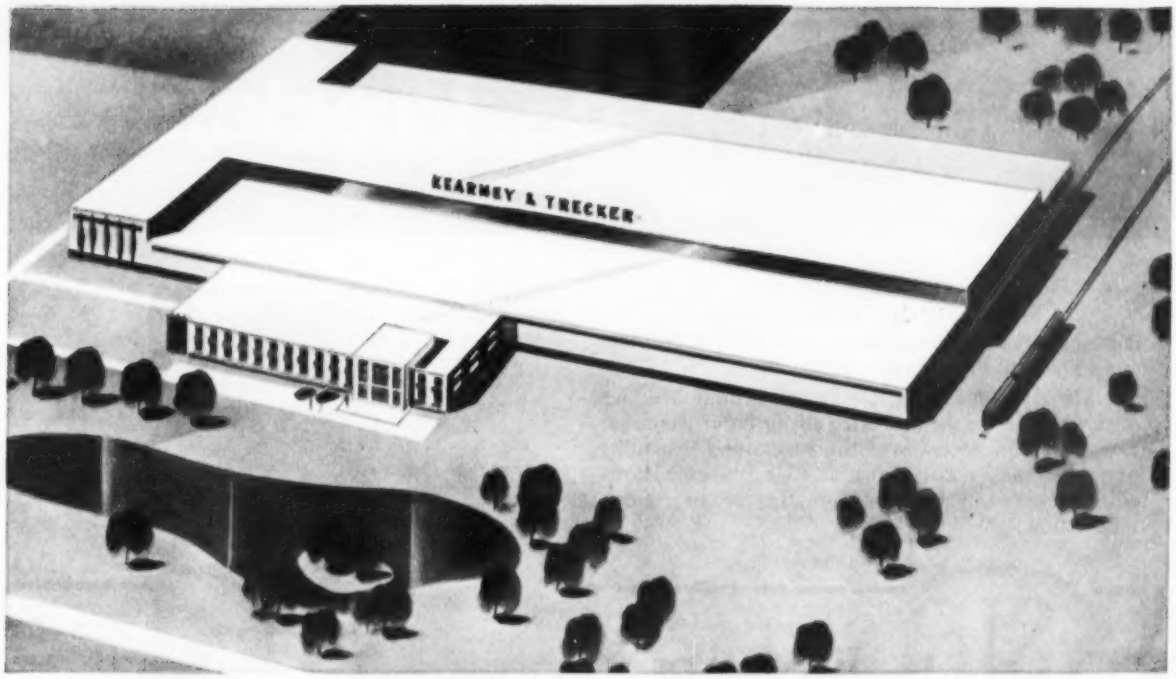
SPEAKING

There are quite a few types of clutches but, within its capacity, the Maxitorq Floating Disc Clutch is not excelled in applications for which it is intended. The Carlyle Johnson Machine Company is celebrating its 50th anniversary of clutch manufacture. Throughout those years, our engineers have developed new design features, more and more compact construction, improved wearing qualities, and better machining practices for maintaining reasonable costs.

Perhaps the outstanding design feature is the patented "Separator Springs," a definite improvement that moved multiple disc clutches up to the front line. Used between each pair of inner discs, they spread them endways with an accordion action, so that light may be seen between all discs when the clutch is in neutral. Therefore, there is no drag, no abrasion, no heating. The discs actually "float" or ride free when the clutch is in the neutral position.

Carlyle Johnson's method of finishing the engaging faces of the discs assures flat, true surfaces. This means that under engagement there are no high or low spots . . . the entire area of the surfaces has an evenly distributed contact. Obviously, disc service life is greatly extended. Such refinements are the result of continuous study by our engineers to make and keep the Maxitorq name high on the list of machine and product designers for their original equipment for control of power transmission.

Your problems are in good hands if you put them up to our engineers for solution. We've traveled the country over to check on the best and most practical installations . . . and we're on call whenever a problem arises. Just ask for Frank R. Simon, The Carlyle Johnson Machine Company, Manchester, Conn.



Here it is! Kearney & Trecker's new Special Machinery Division — nearly 200,000 sq. ft. of new plant with new tools and equipment. An experienced, fully-staffed team of sales, engineering and production experts is ready and waiting to serve you . . . by engineering new production methods.

INCUBATOR . . . for Production Ideas

This plant is being built for you . . . to engineer *new* production methods — to build the large or small special machines, tools and fixtures you need to improve production and cut costs.

Production behind schedule?

Costs going up, up and up?

Will special machines, special tools and fixtures or special arrangements of standard machines help you solve these problems?

Then why not be among the first to take advantage of the 5-million-dollar-plus investment that Kearney & Trecker is making in new plant, new tools and new engineering to help you solve them.

Kearney & Trecker *is no newcomer* to the field of special machine tools and allied special equipment. During the past 50 years millions of dollars worth of Kearney & Trecker special machinery has been produced for plants all over the world. And that doesn't include the 60,000 standard Kearney & Trecker milling machines and other machine tools so well known and so widely accepted everywhere.

Kearney & Trecker is already working on new production ideas, new equipment and tool designs to be produced in this plant. Kearney & Trecker Special Engineering and Methods Analysts are ready right now to serve you with (1) Prompt response to your inquiry, (2) Immediate engineering help on your problem, plus, (3) The newest, finest and most complete facilities to build the special equipment you need — big or small.

Phone, write or wire The Special Machinery Division, Kearney & Trecker Corporation, Milwaukee 14, Wis., today. Get the facts about Kearney & Trecker's Special Machinery Division and how it can serve you.

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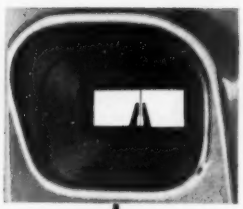
MACHINE TOOLS

Power... Speed... Precision...

SIP Jig Borers are today the key machines in every progressive works where accuracy and reliability are primary essentials.

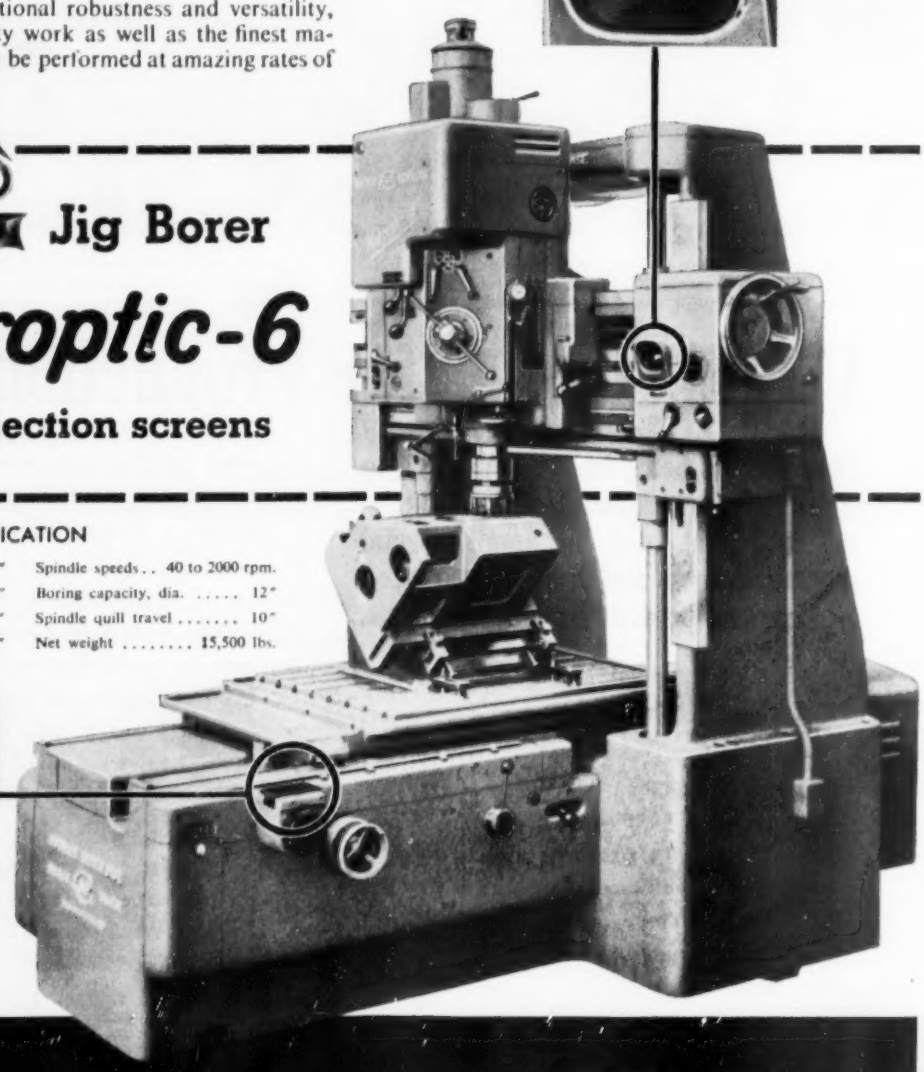
The SIP Hydroptic-6 Jig Boring and Milling Machine, of new design, is the last word in jig borer technique. It features an exceptional robustness and versatility, permitting heavy duty work as well as the finest machining operations to be performed at amazing rates of production.



SIP Jig Borer

Hydroptic-6

with projection screens



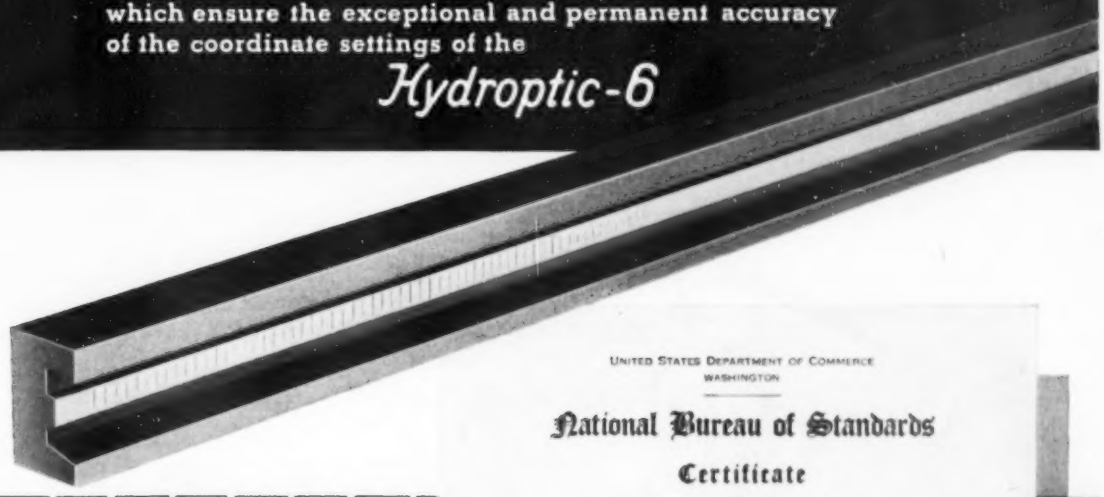
SPECIFICATION

Working range ..... 40" x 28"	Spindle speeds.. 40 to 2000 rpm.
Table surface ..... 43 ¼" x 33"	Boring capacity, dia. ..... 12"
Distance between uprights 43 ¼"	Spindle quill travel ..... 10"
Table to spindle end ... 35 ½"	Net weight ..... 15,500 lbs.

Guaranteed accuracy for all coordinate settings: .00015 in.

This is one of the **standard scales**
which ensure the exceptional and permanent accuracy
of the coordinate settings of the

Hydroptic-6



A most valuable testimonial

Since more than 80 years, the Société Genevoise, Geneva, have supplied length standards to all prominent metrological institutes where they constitute the basis of all linear measurements.
Their unexcelled precision has been repeatedly acknowledged by the highest instances. The certificate illustrated at the right has been issued by the National Bureau of Standards, Washington. It relates to a SIP 40-inch standard scale the calibration of which showed that the total error of the division on the full length was only .00001 inch, a figure which requires no further comment.

Synonymous
with unexcelled accuracy

UNITED STATES DEPARTMENT OF COMMERCE
WASHINGTON

National Bureau of Standards

Certificate

40-inch Steel Bar

Maker: Société Genevoise d'Instruments de Physique.
Maker's No. 2850

Submitted by

Société Genevoise d'Instruments de Physique,
Geneva, Switzerland.

This bar has been compared with the standards of the United States, and a calibration has been made of the one-inch sub-intervals. The results obtained are as follows:

Length of the interval from the zero to the 40-inch line at 20° centigrade, with the bar supported at the points of Bessel:

40.00001 inches.

The observations were made at a mean temperature of 20.04° centigrade and in reducing to 20° centigrade, the coefficient of linear expansion of 0.0000115 per degree centigrade was used.

Calibration of Sub-intervals.
Length of sub-intervals at 20° centigrade.

Interval (inches)	Length (inches)	Interval (inches)	Length (inches)
(0 to 1)	1.00000	(0 to 21)	20.99996
(0 to 2)	2.00001	(0 to 22)	21.99997
(0 to 3)	3.00003	(0 to 23)	22.99997
(0 to 4)	4.00005	(0 to 24)	23.99997
(0 to 5)	5.00002	(0 to 25)	24.99998
(0 to 6)	6.00001	(0 to 26)	25.99999
(0 to 7)	6.99998	(0 to 27)	26.99998
(0 to 8)	8.00001	(0 to 28)	27.99997
(0 to 9)	8.99997	(0 to 29)	28.99998
(0 to 10)	9.99997	(0 to 30)	29.99997
(0 to 11)	10.99999	(0 to 31)	30.99997
(0 to 12)	11.99998	(0 to 32)	31.99996
(0 to 13)	12.99999	(0 to 33)	32.99998
(0 to 14)	14.00000	(0 to 34)	33.99999
(0 to 15)	14.99997	(0 to 35)	34.99999
(0 to 16)	15.99997	(0 to 36)	35.99998
(0 to 17)	16.99998	(0 to 37)	37.00000
(0 to 18)	17.99996	(0 to 38)	38.00002
(0 to 19)	18.99996	(0 to 39)	38.99998
(0 to 20)	19.99995	(0 to 40)	40.00001

Test No. 2.4/125714

Total error of the division on the full length of 40 in. : .00001 in.

REPRESENTATIVE FOR U.S.A. AND CANADA:

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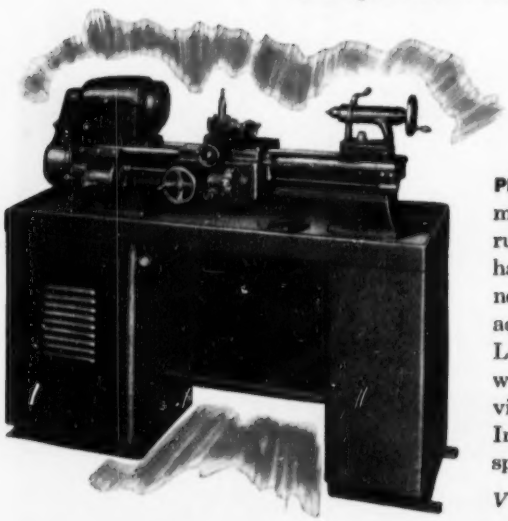
HIGH PRECISION MACHINE TOOLS AND MEASURING EQUIPMENT

100 East 42nd Street NEW YORK 17, N.Y.

A1/

SEE US AT THE CANADIAN INTERNATIONAL TRADE FAIR AT TORONTO, JUNE 1 THRU JUNE 12, 1953—BOOTH 3536-3540

"Jeepers! That putter of Mac's is as accurate as a



Logan LATHE!"

PRECISION RESULTS have made the Logan Lathe one of the world's most widely used machine tools. Logan advanced design and rugged, precise construction assure accuracy that stands up under hard daily use. Because the Logan ball bearing spindle, for example, needs no adjustment for any speed from 45 to 1500 rpm, original accuracy is preserved. The two V-ways and two flat ways of the Logan bed are precision ground to a tolerance of .0005", and are warp-free. 11" swing, 1" collet capacity and 1⅜" spindle hole provide the capacity for a high percentage of any shop's metal turning. Important, too, is the fact that no other lathe of comparable specifications can match the Logan in economy.

Visit your Logan Lathe dealer or write for the Logan Lathe and Shaper Catalog

Logan No. 955
QUICK CHANGE GEAR LATHE
11" Swing, 1" Collet
Capacity, 1⅜" Spindle Hole

LOOK TO LOGAN FOR BETTER LATHES AND SHAPERS

LOGAN ENGINEERING CO.
4901 West Lawrence Avenue, Chicago 30, Illinois

ASK **BAIRD** ABOUT IT!

HIGH PRODUCTION TOOLING

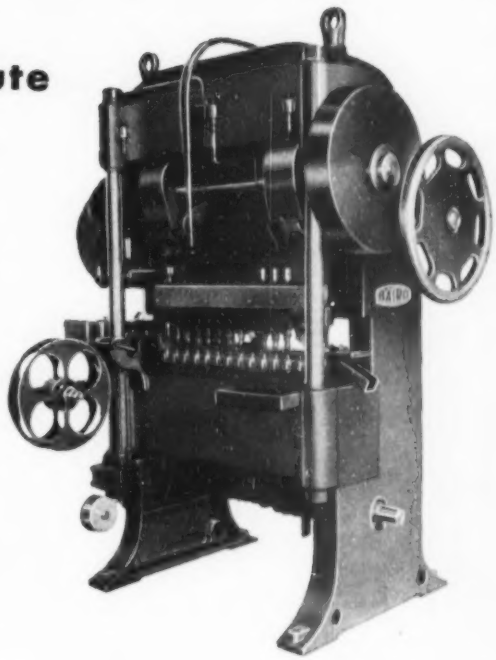
80 complete pieces per minute

FOR PROFITABLE PRODUCTION

Here is low-cost, completely automatic production . . . typical of precision stamping that can be performed on the Baird Multiple Transfer Press.

For complicated work, with punch holders and die blocks . . . transfer slides and fingers . . . progressive operations through 14 stations, might include blanking, drawing, piercing, embossing, slitting, trimming, broaching, sizing, hexing, forming, inserting, and riveting. And tooling is easily replaceable for the work required.

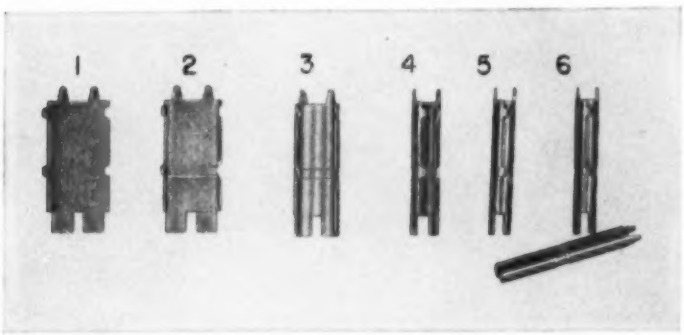
There are 12 press sizes, taking automatically-fed coiled stock from 2½" to 4"; maximum feed length from 2" to 3½". For low-cost, volume production within its range, there's no more profitable automatic than the Baird Transfer Press. Bulletin on request.



BAIRD AUTOMATIC TRANSFER PRESS

Producing an electrical switch part

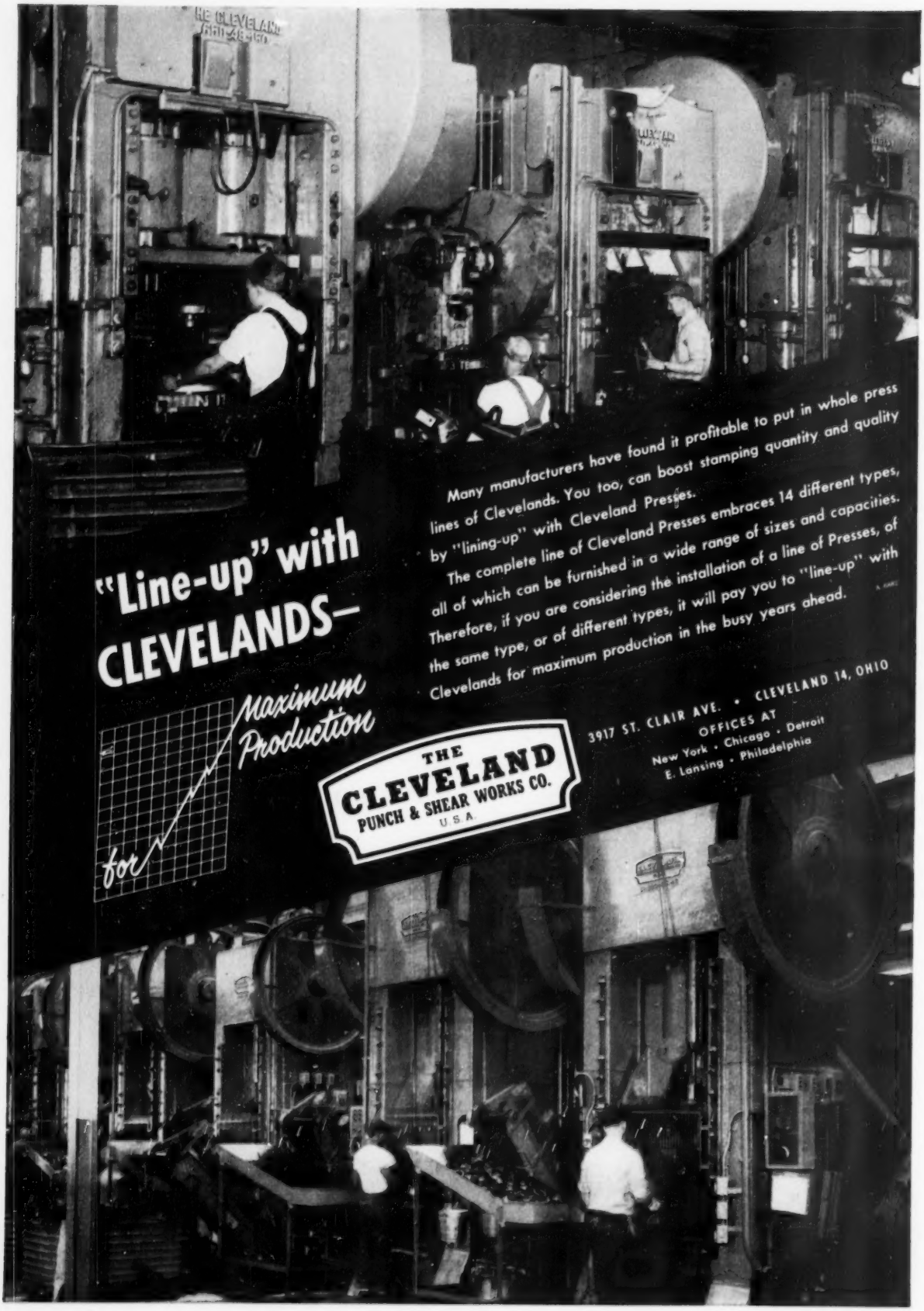
Here is a hollow shaft, used in an electrical switch, that is produced completely in a 6-station die set. At station No. 1, the part is blanked from flat stock. At No. 2, the outer edges are curled . . . and the remainder of the forming operations take place at stations No. 3, 4 and 5. Final sizing is performed at No. 6. This shaft is made in different lengths and variations, by means of interchangeable punches and dies. Production, 80 pieces per minute . . . 4800 per hour.



4BA53

the BAIRD MACHINE COMPANY
STRATFORD • CONNECTICUT

AUTOMATIC HEADING TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS



"Line-up" with CLEVELANDS— for Maximum Production

Many manufacturers have found it profitable to put in whole press lines of Clevelands. You too, can boost stamping quantity and quality by "lining-up" with Cleveland Presses.

The complete line of Cleveland Presses embraces 14 different types, all of which can be furnished in a wide range of sizes and capacities. Therefore, if you are considering the installation of a line of Presses, of the same type, or of different types, it will pay you to "line-up" with Clevelands for maximum production in the busy years ahead.

THE CLEVELAND PUNCH & SHEAR WORKS CO. U.S.A.

3917 ST. CLAIR AVE. • CLEVELAND 14, OHIO

OFFICES AT
New York • Chicago • Detroit
E. Lansing • Philadelphia

Removes 14% more metal with ROTOR CHIPPERS

THIS steel mill tried Rotor C-30 Powerplus Chippers for 3 months and proved their superiority by time studies which showed *14% more metal removed* from 45 to 55 carbon shell stock than with former hammers. Operators say they like them better too—they're *shorter, lighter, and they handle easier.*

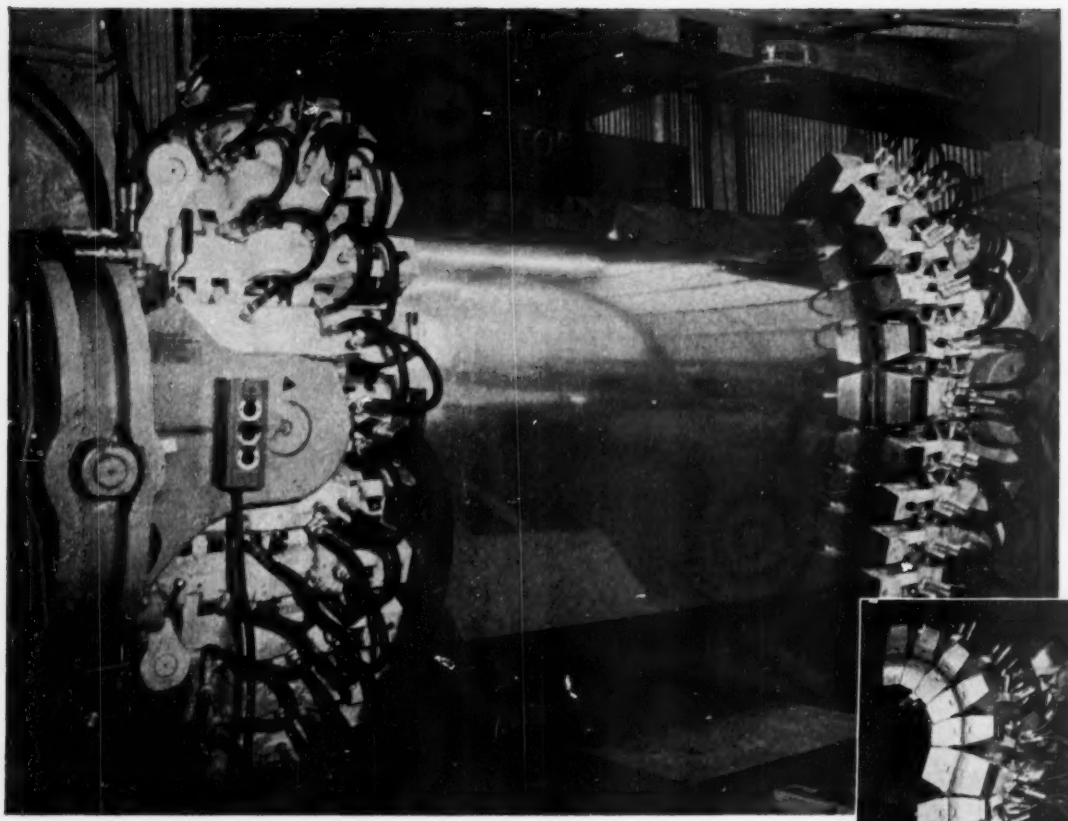
Put these new Rotor Chippers to the test on *your* operations! Ask for a demonstration or trial No obligation. Write for free copy of Catalog 37.

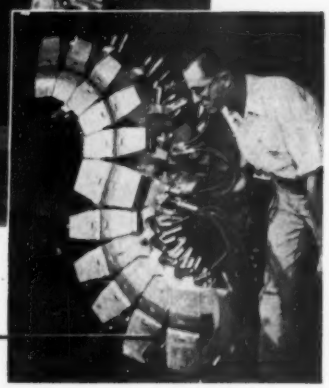
ROTOR CHIPPER FACTS

LIGHTER . . . 1½ to 3 lbs. less than other chippers.

SHORTER . . . 1″ to 2″ shorter . . . easier to get into crowded corners.

MATCH YOUR JOB . . . Each basic model can be adapted to three kinds of work.





This curve is starting a revolution!

Hufford HYDRA-CURVE JAWS widen stretch-wrap forming applications.

Here's a revolution in the making—a new tool that not only cuts costs on many vital sheet stretch-wrap forming operations but does jobs that can't be done by conventional means!

What's different about Hydra-Curve Jaws?—They load like any straight jaw, but before work is stretch-wrap formed, *they curve the sheet to match the cross sectional die curve.*

What you gain—This pre-curving not only permits deeper curves to be shaped, but does so with considerable savings in stock! Sheets no longer must make the exaggerated transitions from a straight jaw to deep convexities or concavities of a die. Fewer wrinkles develop; require less stretching to remove. Scrap losses are negligible.

Big material savings—Outstanding advantage is savings in sheet stock—as high as 30% in extreme cases, depending on die. *Material savings alone amount to several hundreds of dollars daily* in one user's plant.

Lower labor costs—Parts heretofore difficult or impossible to stretch-wrap form are now made with comparative ease. Excellent skin fits on these parts cut assembly hours, adding to plane output.

Saves furnace hours—Many parts can now be satisfactorily stretch-wrap formed from material in the "ST" condition.

Hufford

HYDRA-CURVE JAWS CAN HELP YOU!

This new Hufford development is revolutionizing stretch-wrap forming... it may well be the answer to your forming problem. Write for facts today!

HUFFORD
Machine Works Inc.
EL SEGUNDO, CALIFORNIA

Manufacturers of

Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

How Reducing Tool Hardness Tripled Output

A container manufacturer had been using several different grades of tool steel for rolls used to seam 18-gage sheet steel. The rolls didn't hold up very well. Asked to study the problem, we recommended our A-H5, a 5-pct-chromium, air-hardening grade.

But in treating the rolls the customer proceeded on the principle that a very high hardness would give longest wear—and hardened them accordingly. As a result they failed prematurely, due to breakage caused by inadequate shock-resistance.

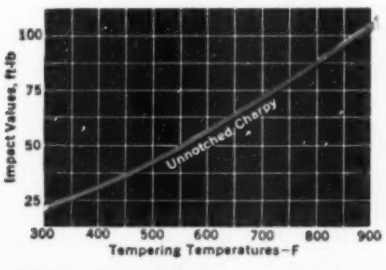
So we made the following recommendations for heat-treatment, asking that they be followed exactly: quench in oil at 1750 F, cool down to 1000 F, air-cool to 150 F, then temper for four hours at 1000 F and again at 950 F. This treatment produced a surface hardness of about Rockwell C-57.

"Not hard enough!" said the customer.

"Give it a trial," we urged.

The first roll so treated lasted nearly twice as long as any previous roll, making 58,000 seams on one groove with very little evidence of wear. A second roll made nearly 100,000 seams!

A tool that's close to its maximum hardness is likely to be brittle. And tools wear too rapidly if hardness is low. That's why most production tools and dies are treated so as to get an ideal compromise between hardness and toughness.



HARDNESS VS. TOUGHNESS — This curve shows how the impact-resistance of a carbon tool steel increases as the hardness is reduced by higher tempering temperatures.

Our modern mill depot is geared for fast shipments of tool steel to distributors everywhere. A wide selection of sizes is stocked in 22 grades of steel.

TOOL STEEL...WHEN YOU WANT IT!

Distributors of Bethlehem tool steel are ready to fill your tool-steel orders from their local stocks . . . in strategic cities throughout the country. Our own mill depot at Bethlehem, Pa., is completely stocked with several thousand sizes of 22 different tool-steel grades for quick shipment to our distributors and to mill customers. Whether you need one short bar or a carload, you can count on fast delivery when you specify Bethlehem.

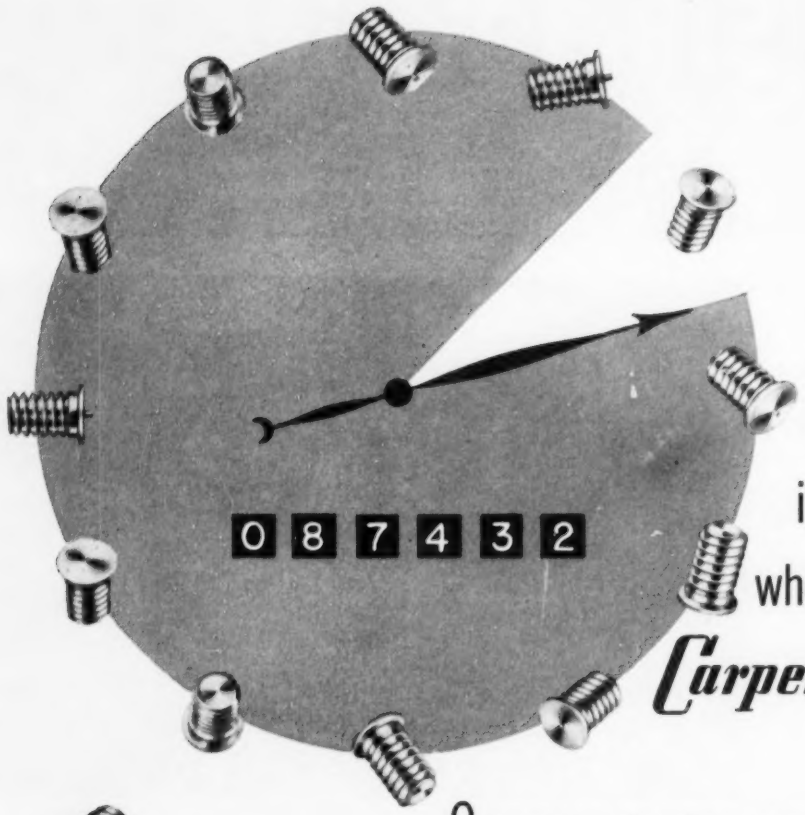
Our complete line includes: carbon and carbon-vanadium, oil- and air-hardening, shock-resisting, hot-work, high-speed steels . . . and steels for die-casting dies, plastic molds, brake dies and other special applications.

And remember—Bethlehem metallurgists are on call whenever you have tool-steel problems.

HEAVY-DUTY PUNCH

Made of our 67 Chisel, this punch forms parts from .185-in. sheet steel in a 300-ton hydraulic press. The punch must take a lot of shock; and that's why this chrome-tungsten tool steel stands up so well. It's hardened to Rockwell C-58.

The lower die, hardness Rockwell C-61, is made of Lehigh H—our popular grade of high-carbon, high-chromium steel. About 5000 pieces are produced on this heavy-duty job before redressing is required.



You can run a job in less time when you use *Carpenter* stainless!

On job after job, plants like yours have found the secret of faster, trouble-free production of Stainless parts. The job shown here is an example. Again, it proves that not all free-machining stainless steels of the same type number are alike. And that's the big reason why more and more specifications come through marked "Carpenter Free-Machining Stainless." For Carpenter Stainless comes to you with a famous pedigree . . . it originates in the Mill that invented the first free-machining Stainless. And ever since, this same pioneering leadership has been concentrated on improving the workability and uniformity of stainless steels. Results: fewer rejects, better finishes, higher spindle speeds, reasonable fabricating costs.

Even in these times when many nickel-bearing grades of stainless may be hard to get because of Government Regulations, Carpenter's program of stainless research and development goes on at a steady pace. Now and in the future you can continue to count on Carpenter for Stainless you can use to run a job in less time, at a lower cost. THE CARPENTER STEEL COMPANY, 109 W. Bern St., Reading, Pa.

These studs for securing hinges to dishwashers were turned out faster when the change was made from an ordinary Type 303 Stainless to Carpenter No. 8, Type 303. The customer reports: "Because of higher output and fewer rejects we can produce each stud at a 25% saving . . . and get a far superior finish!"

Export Department: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

Carpenter STEEL

Free-Machining Stainless

takes the problems out of production

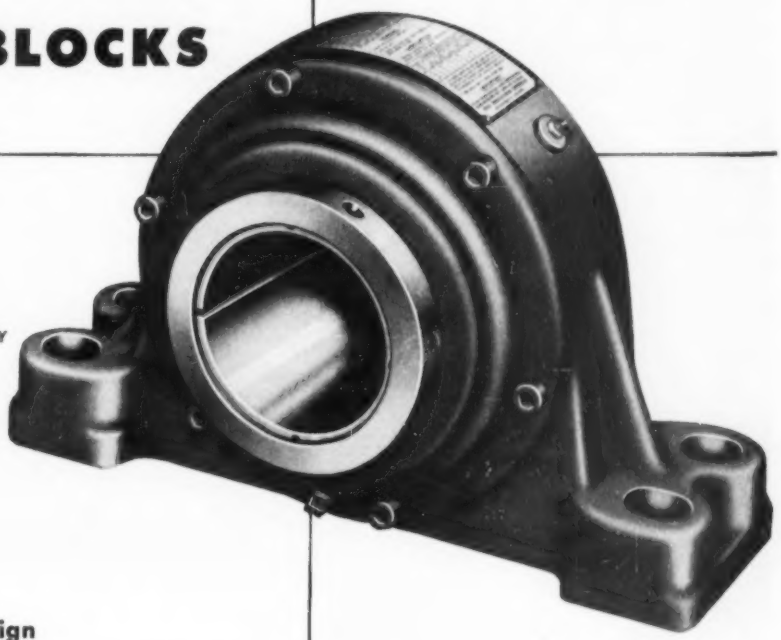
Call your nearest Carpenter Mill-Branch Warehouse, Office or Distributor

NEW

DODGE-TIMKEN ALL-STEEL PILLOW BLOCKS

HEAVY DUTY CAPACITY!

LESS SPACE! LESS WEIGHT!



A JOINT ENGINEERING DEVELOPMENT BY DODGE AND THE TIMKEN ROLLER BEARING COMPANY

- All-Steel construction
- A new Timken bearing design
- High radial and thrust capacities
- Compact—minimum dimensions
- Minimum weight with maximum strength
- Fully self-aligning with spherical outer race
- Both expansion and non-expansion types
- Adapter mounting, proven through the years
- Double piston ring seals
- Sealed both on and off the shaft
- Fully assembled, permanently adjusted, lubricated and sealed at the factory

Here are the bearings for industry's toughest jobs. High radial and thrust capacities. Stamina to take heavy shock loads. And all-steel construction packs this load-carrying capacity into less weight and less space. Engineers are already specifying "Dodge-Timken All-Steel" for some of America's largest projects. Write for details and delivery dates, or call your Dodge Distributor.

DODGE MANUFACTURING CORPORATION
100 Union Street, Mishawaka, Indiana

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new cost-saving methods. Look for his name under "Power Transmission Equipment" in your classified phone book.

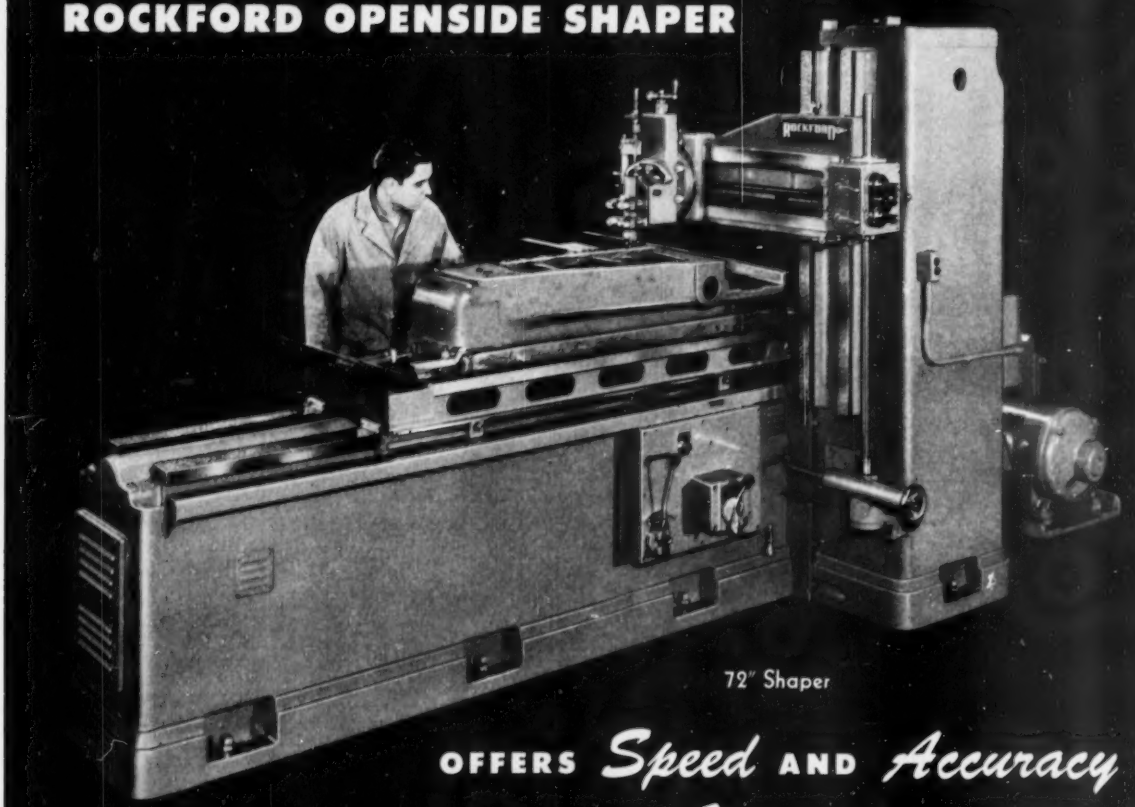
DODGE
of Mishawaka, Ind.

NAME PLATES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY,
CHICAGO THRIFT-ETCHING CORPORATION, 1555 SHEFFIELD AVENUE, CHICAGO 22, ILLINOIS

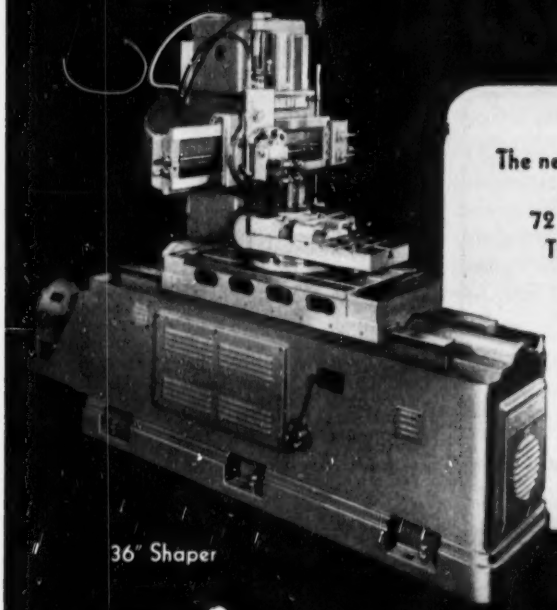
NEW.....

ROCKFORD OPENSIDE SHAPER



72" Shaper

OFFERS *Speed* AND *Accuracy* PLUS *Versatility*



36" Shaper

The new 72" Rockford Openside Shaper gives you best results on *all* shaper jobs — with stroke lengths up to 72 inches.

This "big brother" of the Rockford Openside Shaper family (36", 48", 60", 72") has all the superior features of companion models, *plus* increased capacity. It's the maximum in versatility — large-job capacity with no sacrifice in speed or accuracy. And It's *Hydraulic* . . . of course.

Before you invest, investigate the new 72" Rockford Openside.

Hy-Draulic

ROCKFORD MACHINE TOOL CO.

2500 Kishwaukee Street • Rockford, Illinois

tool steel is our special pride!

Just as mother was known for a special dish, so Crucible stands for the finest in tool steel. For a half-century we have enjoyed this reputation. Naturally, we are proud of it.

We are keeping our research and development in step with industry's everchanging needs for tool steel. We are offering you the benefits of our metallurgical service to solve unusual problems. And we are maintaining full stocks in conveniently-located warehouses so you can get prompt delivery of tool steel.

SEND TODAY for the unique Crucible Tool Steel Selector—a twist of the dial gives the tool steel for your application.

Rex® High Speed Steels
Peerless Hot Work Steels
Halcomb 218
Chro-Mow®
Sanderson Carbon Tool Steels
Ketos®
Airkool Die Steel
Airdi® 150
Nu-Die V Die Casting Steel
CSM 2 Mold Steel
La Belle® Silicon #2
Atha Pneu

SPECIFY YOUR TOOL STEELS BY THESE BRAND NAMES

Crucible Steel Company of America
Dept. A, Chrysler Building, New York 17, N. Y.

Name_____

Company_____ Title_____

Address_____ City_____ State_____

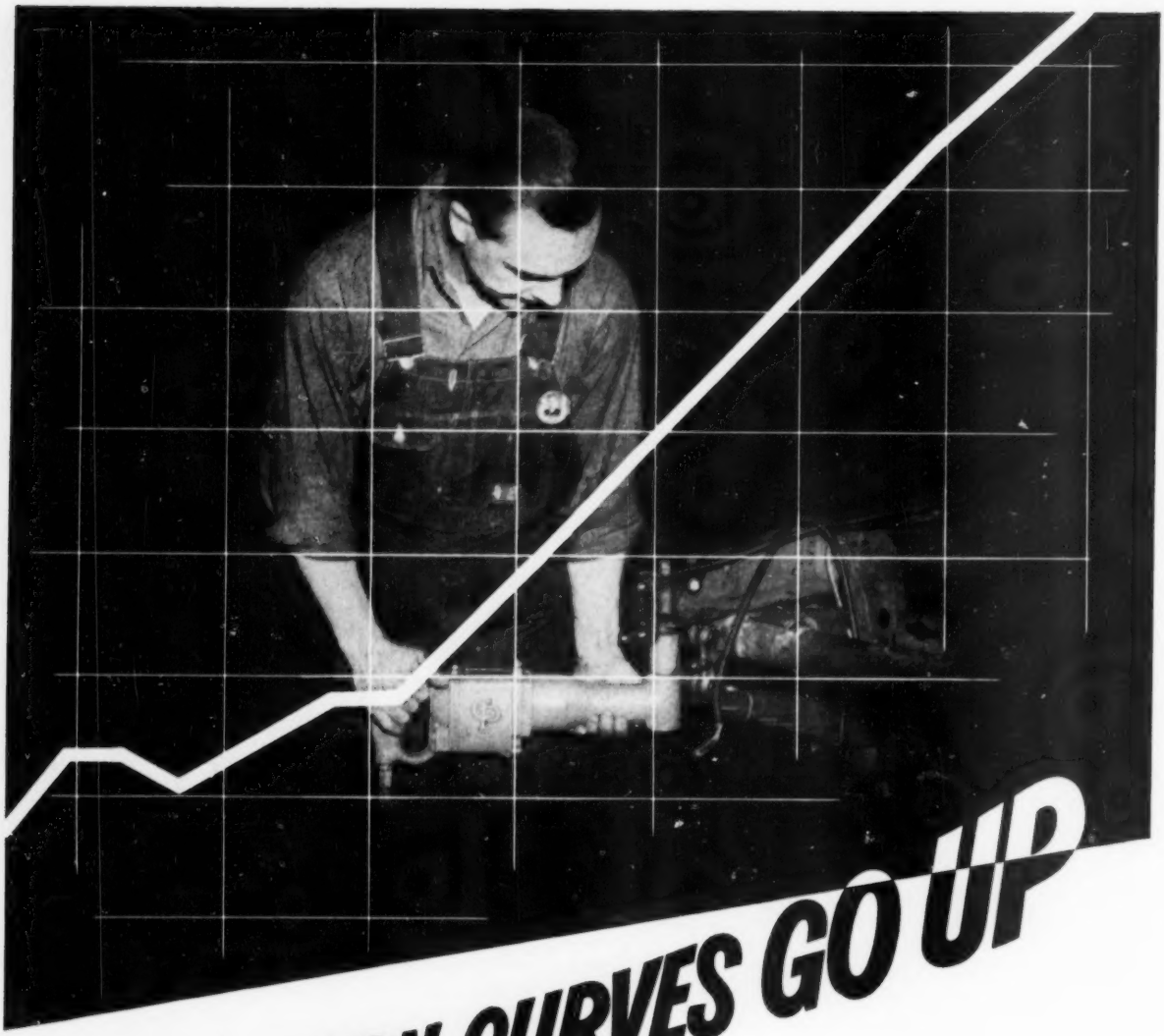
9" diameter, 3-colors

CRUCIBLE first name in special purpose steels

53 years of Fine steelmaking

TOOL STEELS

CRUCIBLE STEEL COMPANY OF AMERICA · TOOL STEEL SALES · SYRACUSE, N. Y.



PRODUCTION CURVES GO UP

CAPACITIES	BOLT SIZE
CP-337	¼"
CP-344	⅜"
CP-3440	⅜" heavy duty
CP-349	½"
CP-360	¾"
CP-3630	¾" heavy duty
CP-365	1⅛"
CP-375	1¾"

Today's cost control and time study experts are always on the alert for ways of increasing production and cutting costs. That's where Chicago Pneumatic's reversible Air Impact Wrenches can help out. CP's complete line of reversible air impact wrenches with angle-head models in all sizes for reaching awkward, hard-to-get spots save from 25 to 75% of nut running and removal time.

Fast and easy-to-handle CP Air Impact Wrenches are powerful and smooth operating without fatiguing torsional thrusts . . . have adaptable power regulators. Available with side, pistol grip or straight handles. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, New York.*

Chicago Pneumatic

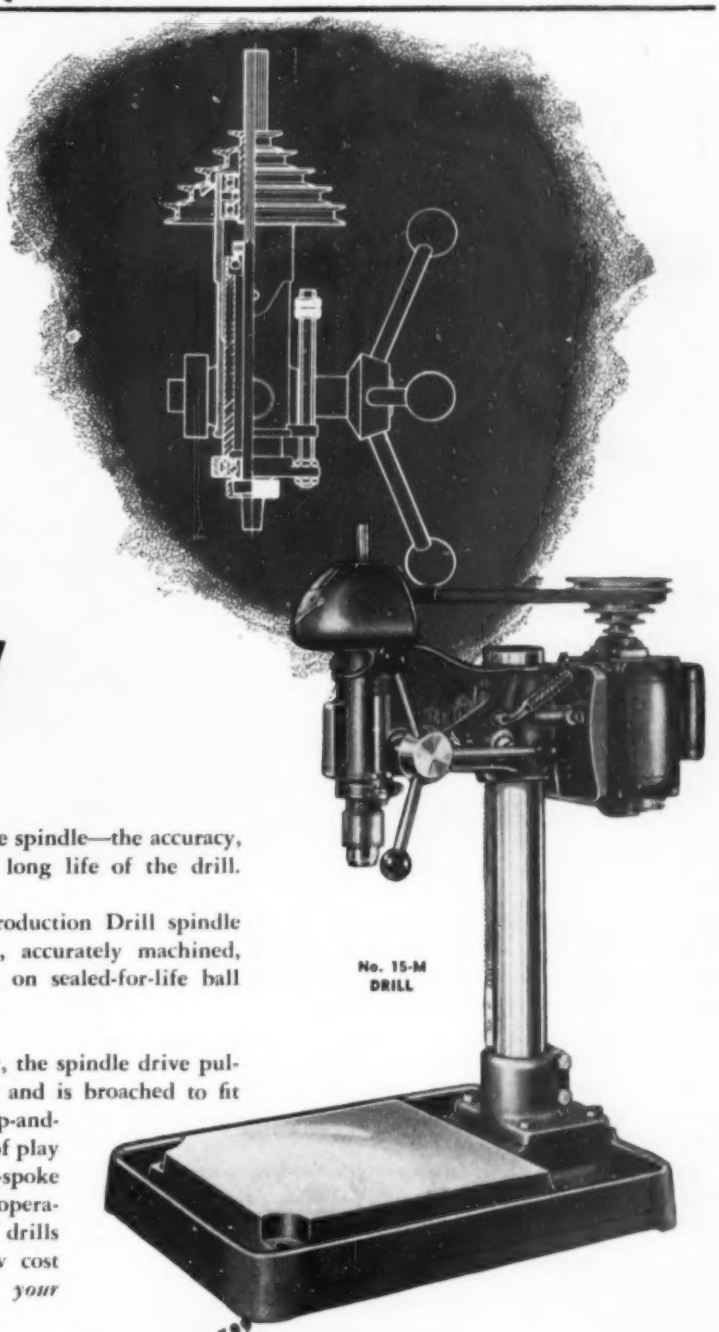
PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

"Buffalo"

Tips on Better DRILLING

JUDGE HOW A DRILL WILL PERFORM by its

SPINDLE ASSEMBLY



No. 15-M DRILL

In judging a drill, so much depends on the spindle—the accuracy, the ease of handling, serviceability and long life of the drill.

This diagram of a "Buffalo" No. 15 Production Drill spindle shows why. The spindle is alloy steel, accurately machined, ground and polished—smoothly turning on sealed-for-life ball bearings and free of end play.

For further ease of handling and accuracy, the spindle drive pulley runs on two precision ball bearings, and is broached to fit the 6 spindle splines so accurately that up-and-down sliding action of the spindle is free of play yet practically frictionless. The handy 3-spoke feed and adjustable spring return reduce operator fatigue. Why not look into this line of drills built essentially for easy, accurate, low cost work? Write for recommendations on *your* drilling problem!

DIAMOND JUBILEE 75TH ANNIVERSARY

"Buffalo" MACHINE TOOLS

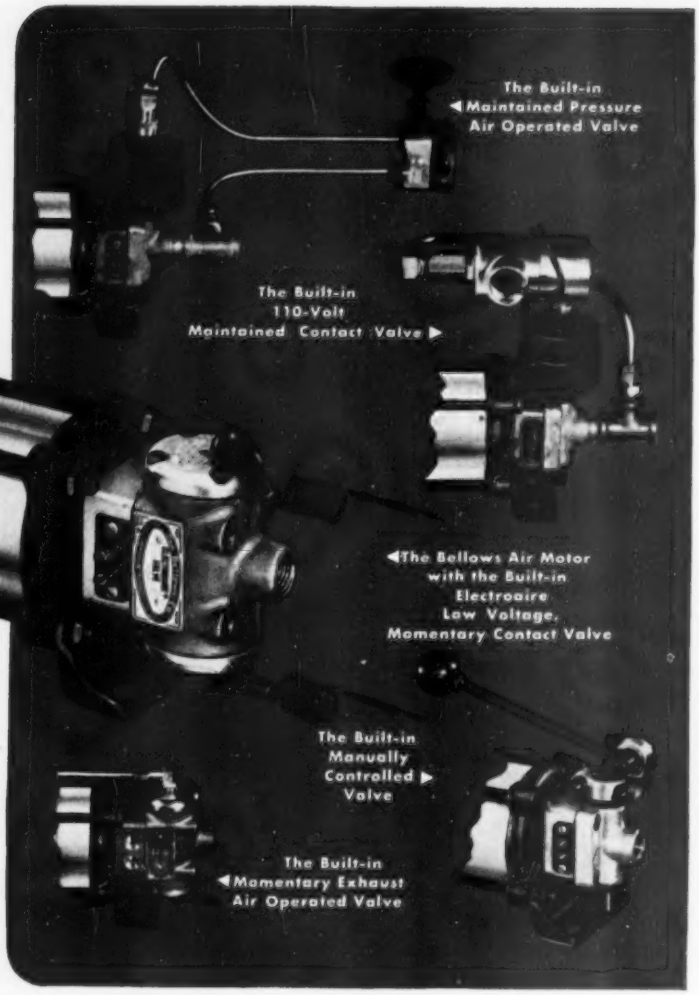
BUFFALO FORGE COMPANY

509 BROADWAY BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING SHEARING CUTTING BENDING

The Bellows AIR MOTOR



is now available with your choice of built-in valve arrangements

IN DESIGNING for pneumatic operation of equipment, the air engineer can now choose the method of valving he prefers — and still have all the advantages of integral valve and cylinder construction.

The Bellows Air Motor — the only air cylinder with an integral valve—proven in over 150,000 installations —is now available with a range of built-in valve controls that offers the engineer every latitude in pneumatic design.

If he prefers to use momentary contact low voltage control, standard or explosion-proof, Bellows has it. If he prefers 110 volt maintained contact for interlock with established electrical circuits, Bellows has it. If he prefers to control his pneumatic circuits manually, Bellows has it. Or should his designs call for full pneumatically controlled operations, Bellows offers a choice of two control systems.

Basic to all valving arrangements is the time-proven Bellows four-way directional slide valve with its integral controls for regulation of piston rod speed. Basic, too, is the single air connection which may be flexible hose, and which does away with multiple piping. It is in the methods used to shift the directional slide valve that this new flexibility in air control becomes so apparent.

All Bellows Air Motors, with any integral valve control, are available in five bore sizes: 1¼", 1¾", 2½", 3⅜" and 4½" and in stroke lengths up to 48". A wide range of mounting styles further adds to the flexibility of this compact, self-contained power unit.

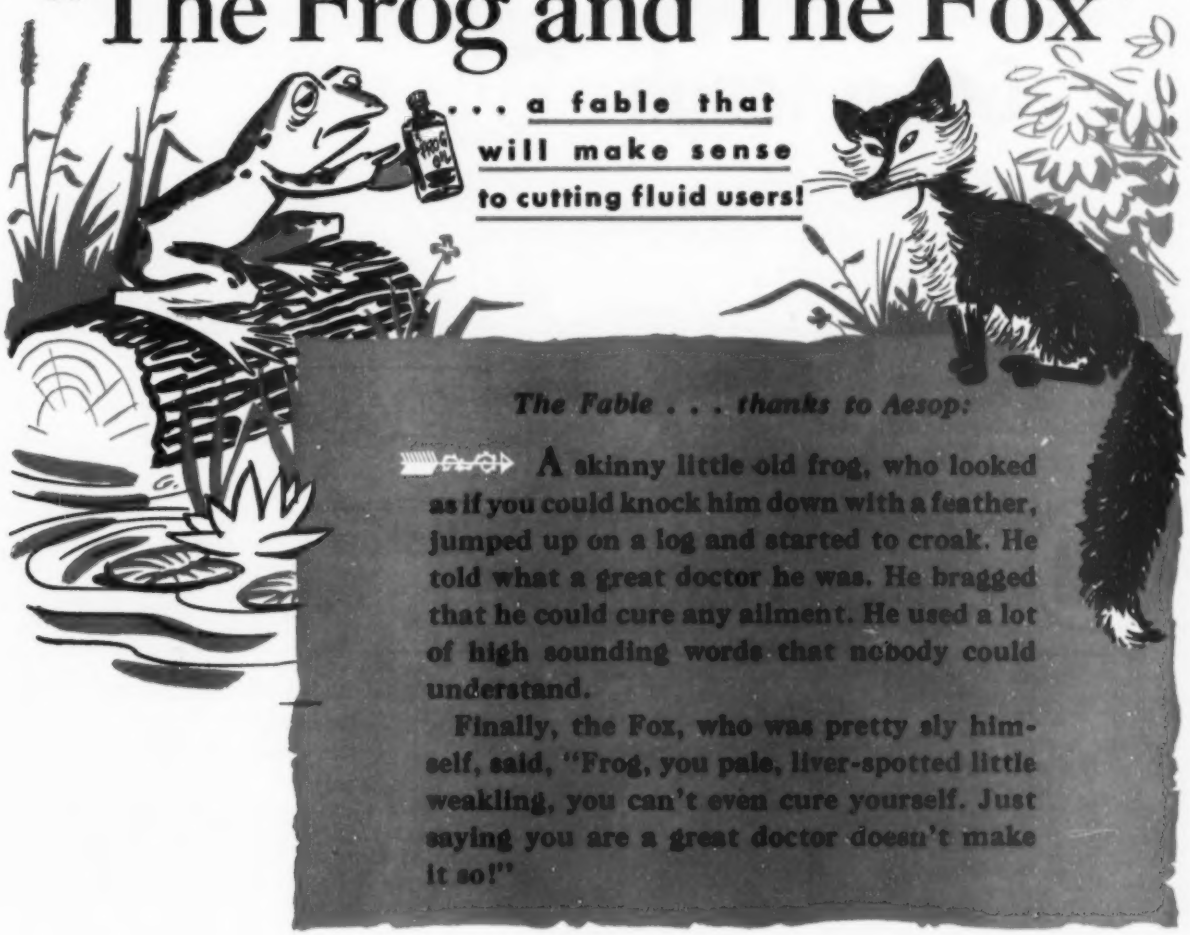
The Bellows Co.

AKRON 9, OHIO

Bellows "Controlled-Air-Power" for Faster, Safer, Better Production

602A

"The Frog and The Fox"



. . . a fable that will make sense to cutting fluid users!

The Fable . . . thanks to Aesop:

A skinny little old frog, who looked as if you could knock him down with a feather, jumped up on a log and started to croak. He told what a great doctor he was. He bragged that he could cure any ailment. He used a lot of high sounding words that nobody could understand.

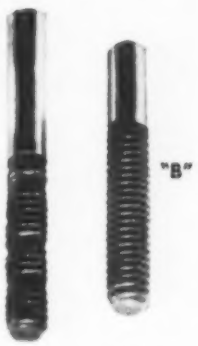
Finally, the Fox, who was pretty sly himself, said, "Frog, you pale, liver-spotted little weakling, you can't even cure yourself. Just saying you are a great doctor doesn't make it so!"

The Sense the Fable Makes:

You are often told that there are miracle-working cutting fluids that will cure all your problems in machining everything from brass to stainless. They often turn out to be like the phoney frog in the fable. Here is an example:

A Stuart Oil customer was using Stuart's SpeedKut B Cutting Oil on his Brown & Sharpe automatics for threading SAE 1020 material. He was induced to try a "do-everything" product on the job. Picture A shows what happened! Picture B shows the same job machined with Stuart's SpeedKut. The "frog oil" didn't have enough cutting value.

Ask to have a Stuart Representative show you how the correct cutting fluid for the job, correctly applied, can save you time, money and material. Use the handy coupon below.



with "frog oil" — with Stuart's SpeedKut B

More Than a "Coolant" is Needed

D.A. Stuart Oil Co. LIMITED
EST. 1865

TIME-TESTED CUTTING FLUIDS AND LUBRICANTS

2729 S. Troy St., Chicago 23, Ill.

CLIP TO YOUR COMPANY LETTERHEAD AND MAIL

to D. A. Stuart Oil Co., Ltd., 2729 S. Troy St., Chicago 23, Ill.

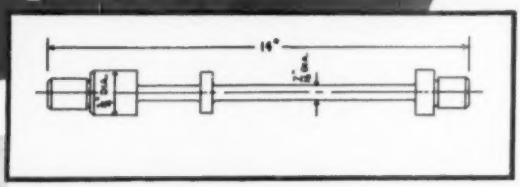
Please ☐ Have Stuart Representative call

Check ☐ Send Booklet "Cutting Fluid Facts"

Your Name .....

Title .....

Got a tough turning problem?



HIGH SPEED HYDRAULIC Copying Lathes

will show you how easy it can be!

H.E.B. Copying Lathes are solving turning problems in these plants:

- Acromatic Tool Company
- Beaver Precision Products, Inc.
- Buick Division, General Motors Corp.
- De Laval Separator Co.
- East Coast Aeronautics, Inc.
- Electrol, Inc.
- Fox River Ordnance Plant
- Harvey Machine Tool Company
- Manufacturers Tool & Gauge Co.

. . . *AND MANY OTHERS!*

- **Slash production time**
- **Produce better finish and closer tolerances**

We'd like to make your troublesome jobs easy. *SEND US A PRINT OF YOUR MOST DIFFICULT TURNING JOB* for analysis by our engineering staff! We think we can prove to you that the H.E.B. is "*The* Way to Turn!" There's no charge or obligation, of course.

That spindle you see in the drawing has actually been *copy*-turned on the H.E.B. in just 2.1 minutes floor-to-floor time, machined from SAE 1040 . . . and every copy-turned part is identical.

Rigidly constructed H.E.B. Copying Lathes – OP Model, with built-in tracer device and 20 H.P. motor take heavy cuts with carbide tools at spindle speeds up to 3600 RPM. GT Models with rotating pattern are designed for copying irregular, non-circular work. Great for short runs as well as large scale production because setup time is only about 20 minutes!

Ask for a demonstration *now* or for detailed literature – Study our insert in Sweet's Machine Tool catalog!

IMMEDIATE DELIVERY

H·E·B

"THE WAY TO TURN"

H.E.B. MACHINE TOOLS, INC.

475 FIFTH AVENUE • NEW YORK 17, N. Y.

LExington 2-0266

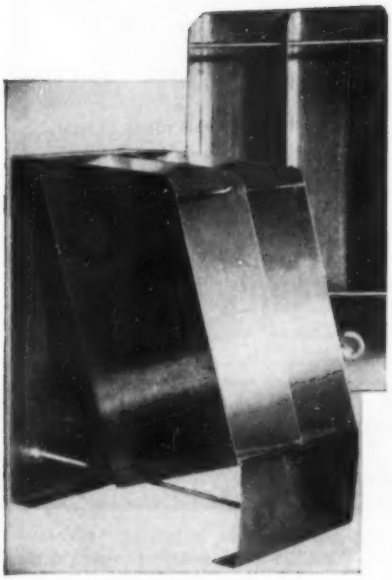
COPYING LATHES • ENGINE LATHES WITH COPYING ATTACHMENTS • TOOL ROOM LATHES • CARBIDE TOOL GRINDERS

SOME ANSWERS

TO YOUR SHOP QUESTIONS

ON forming STRAIGHT-CHROMIUM STAINLESS STEELS

This is one of a series of advertisements discussing the straight-chromium grades of Stainless Steel from the standpoint of fabricating performance. Other operations that will be considered are machining, cutting, deep drawing, spinning, welding and finishing.



Formed from
U·S·S 17 (Type 430) Stainless Steel

These utensil racks were fabricated from 16 gage sheets and ⅝" rods of U·S·S 17 (Type 430) Stainless Steel by Purity Manufacturing Company, Cattaraugus, N. Y. Forming was done on a press brake and bends exceeding 90° were accomplished without difficulty. Other fabricating operations included argon and spot welding and grinding.

Purity Manufacturing turned to straight-chromium fabrication more than a year ago, after years of specialization on dairy industry equipment of nickel-bearing Stainless Steel. They have encountered no difficulty in fabrication.

OF the Stainless Steels available today, straight-chromium grades—and especially U·S·S 17 (Type 430)—offer you the widest possibilities in fabrication and end use.

Press and brake forming of sheet and strip are among the most common shop operations encountered in working these grades. Here are a few facts to keep in mind for such operations in order to get the maximum performance from straight-chromium grades.

Type 430 Stainless Steel has a lower tensile strength than the nickel-bearing grades. This permits it to be formed on tools that have less power available than those used for nickel-bearing grades. Forming tools rated at a definite capacity for carbon steels are suitable for straight-chromium Stainless Steels of approximately the same thickness.

Although additional steps or operations may be required, fabricators who have worked with straight-chromium grades generally report that almost anything that can be made from nickel-bearing Stainless Steel can also be formed from straight-chromium grades.

In planning and layout, take into consideration the fact that Type 430 possesses directional properties. As a result, it is sensitive to longitudinal breaking in the course of lock seaming and bending. Additional steps or operations will offset this tendency.

In every case it will pay you to consult with our representatives concerning these grades. They will examine the job from the standpoints of both end use and shop equipment and give you their recommendations.

WRITE FOR OUR FREE BOOK

You'll find the full story on working characteristics of the straight-chromium grades of U·S·S Stainless Steel, as well as nickel-bearing grades, in our book "Fabrication of U·S·S Stainless and Heat Resisting Steels." For your copy, write to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

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9-43

UNITED STATES STEEL

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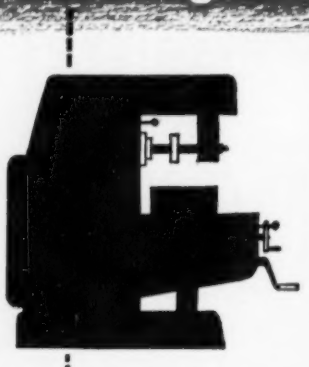

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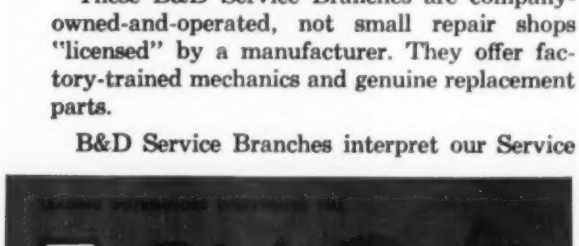

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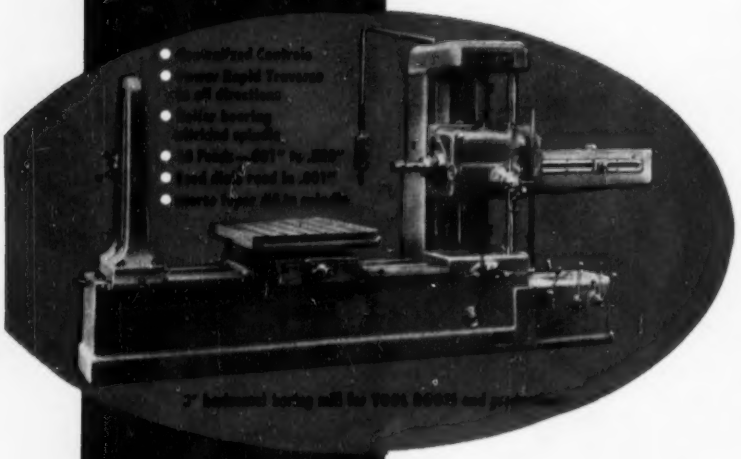

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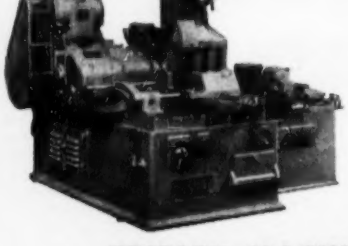

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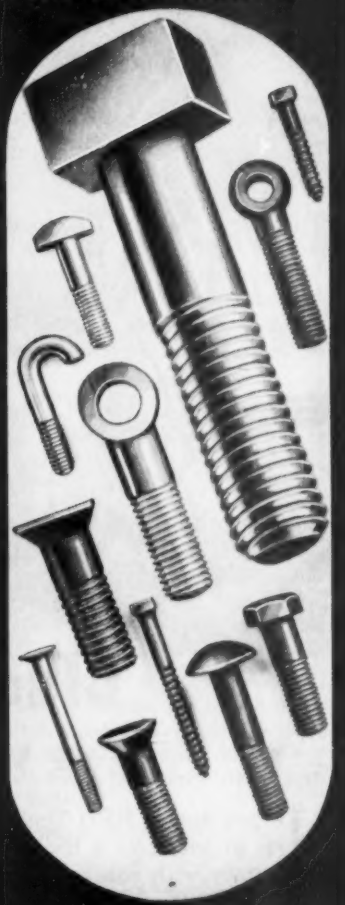

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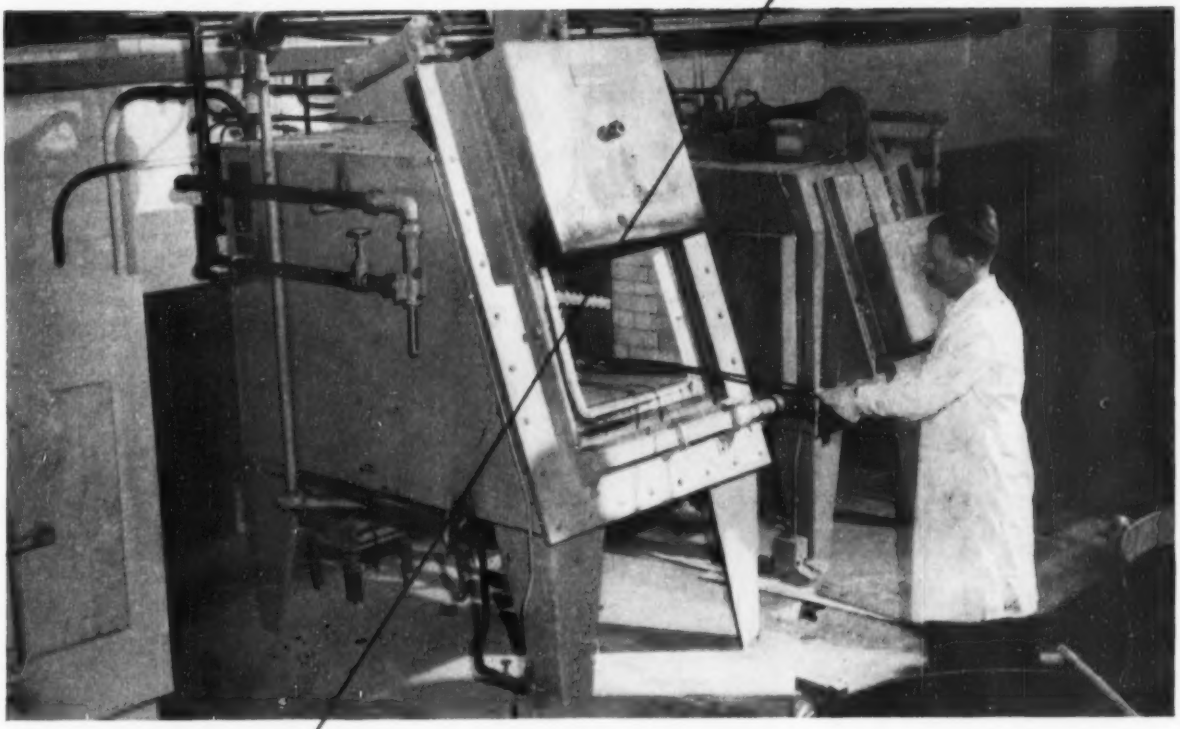

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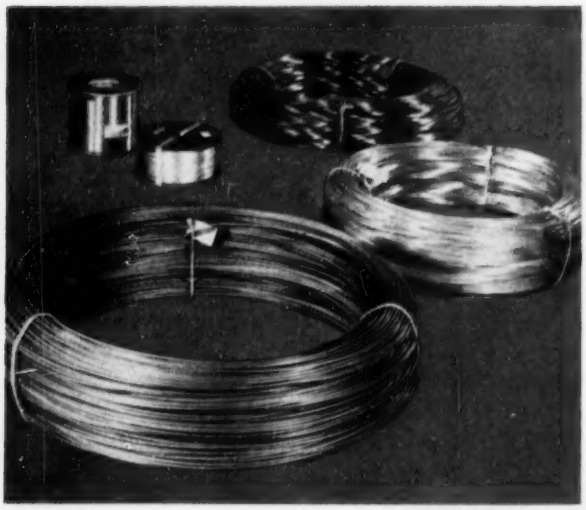

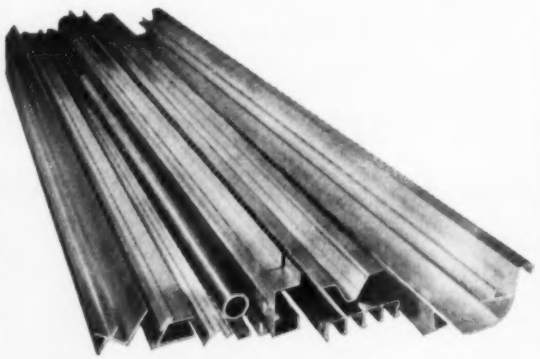

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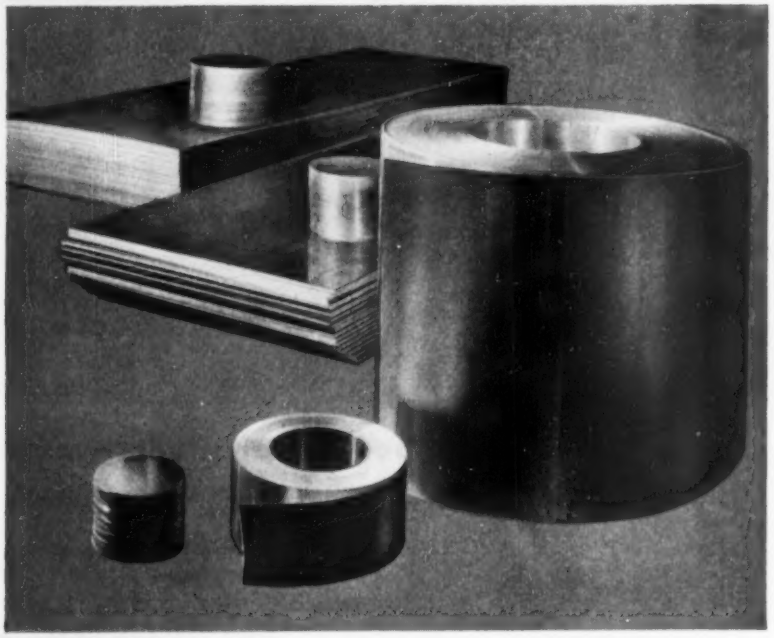

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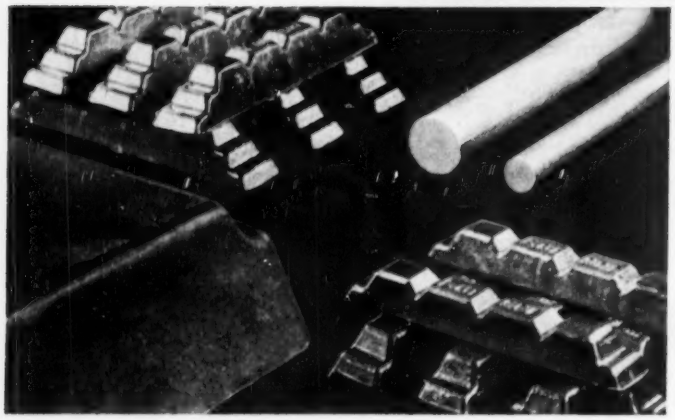

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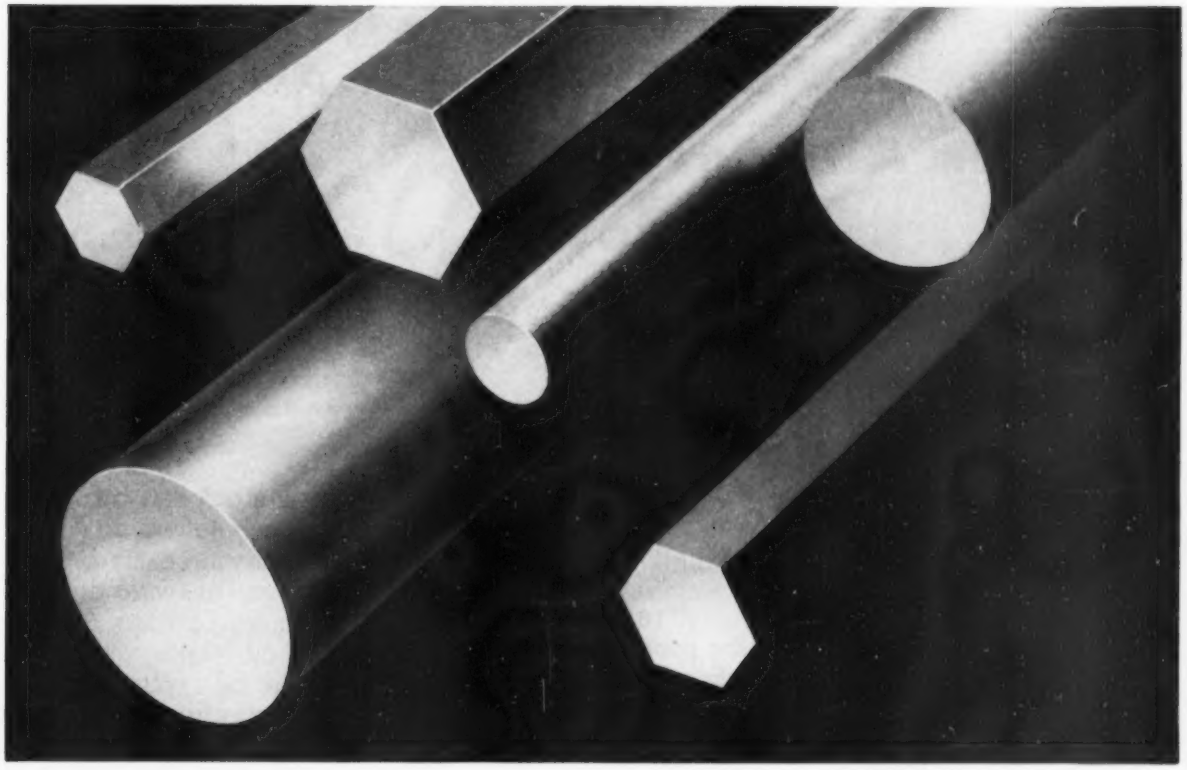

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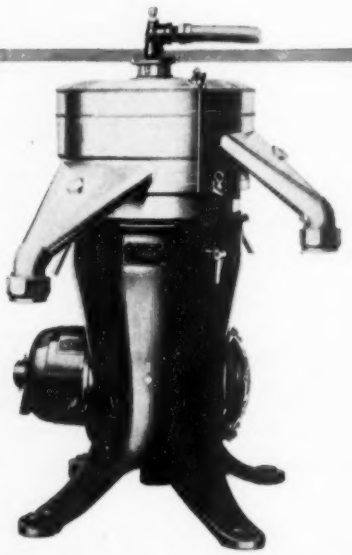

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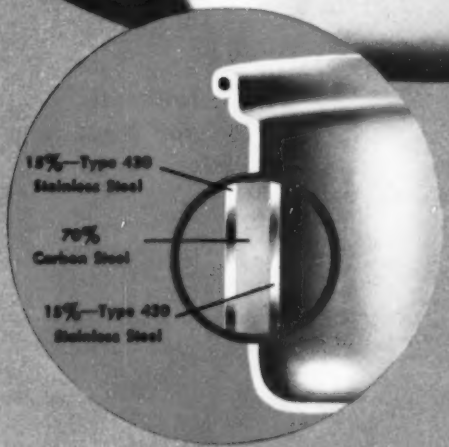

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3. Distance center of Spindle to Frame (Gap)*	12-1/4"	12-1/4"	12-1/4"
4. Maximum Spindle Travel	12"	16"	16"
5. Spindle—Outside Dia. splined driving end	2"	2-13/16"	3-1/4"
6. Dia. of Spindle Sleeve	3-1/4"	4-1/4"	5-1/4"
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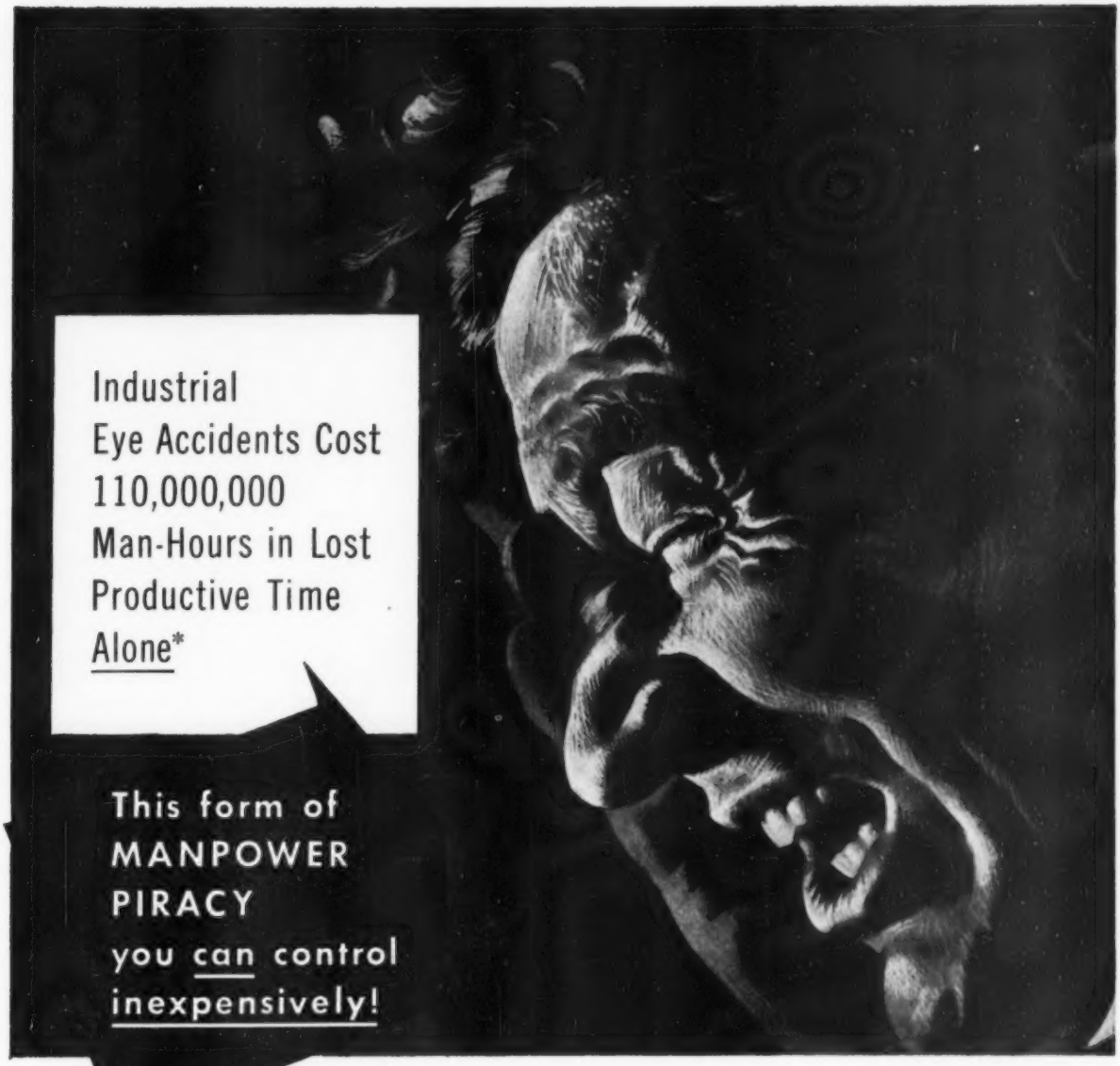

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*Estimate. Industrial eye injuries cost over $5 per employed worker per year — with compensation averaging nearly $400 per injured man.

American Optical
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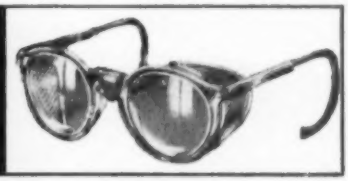

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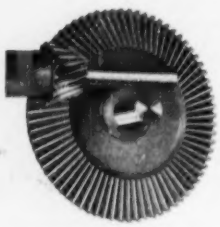

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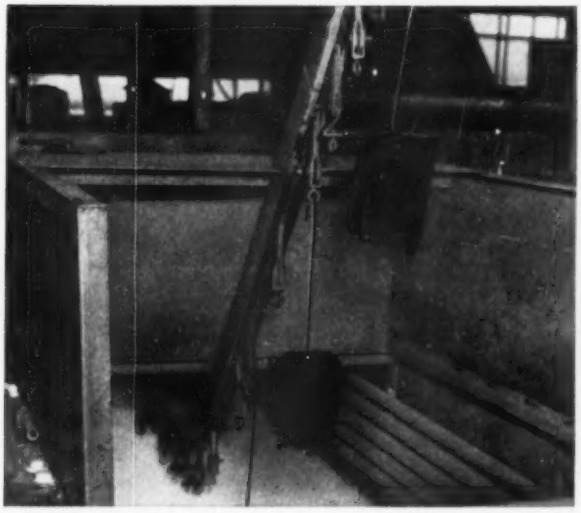
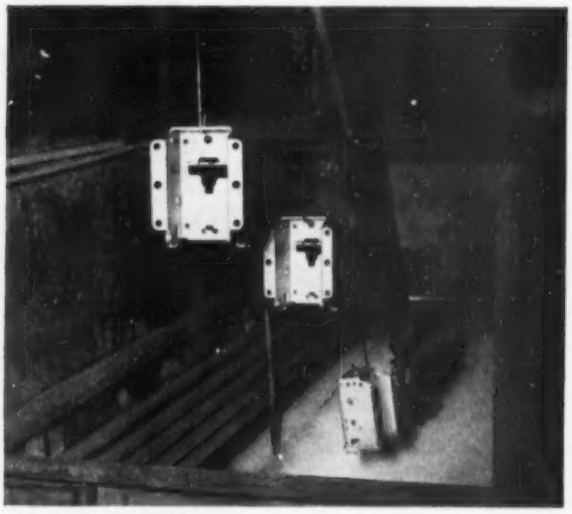


GREASE-COVERED switch gear housings enter vapor degreasing unit by conveyor. A system such as this permits smooth, even flow of housings at high production speed.



CLEAN, WARM AND DRY—the housings emerge from the unit ready for inspection, assembly or further processing—in less than a minute.

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Du Pont metal cleaning specialists are experienced in keeping degreasing installations at peak efficiency. They will be glad to assist you in all phases of your metal cleaning program. For this friendly service, simply get in touch with your nearest Du Pont district office.

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You'll find complete information on the operation and maintenance of vapor degreasing equipment in these booklets. And interesting up-to-date case histories about degreasing units in operation throughout the metal field are presented in our publication, "MODERN METAL FINISHING." You can receive this wealth of information by checking the appropriate boxes in the coupon below and returning it to us.

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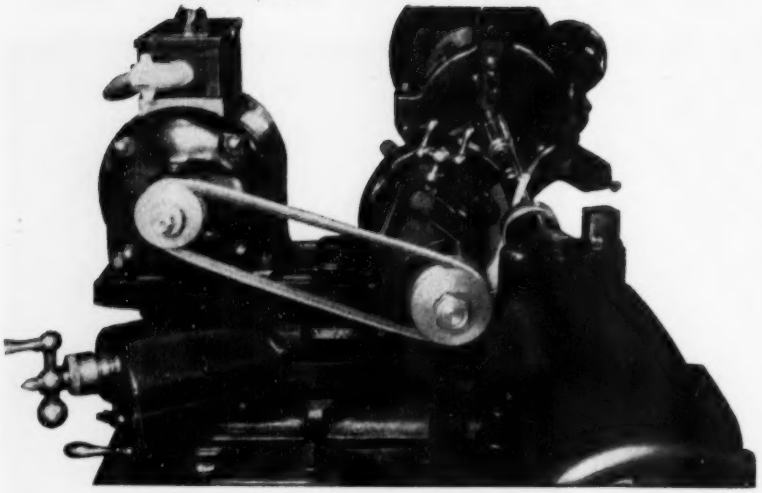

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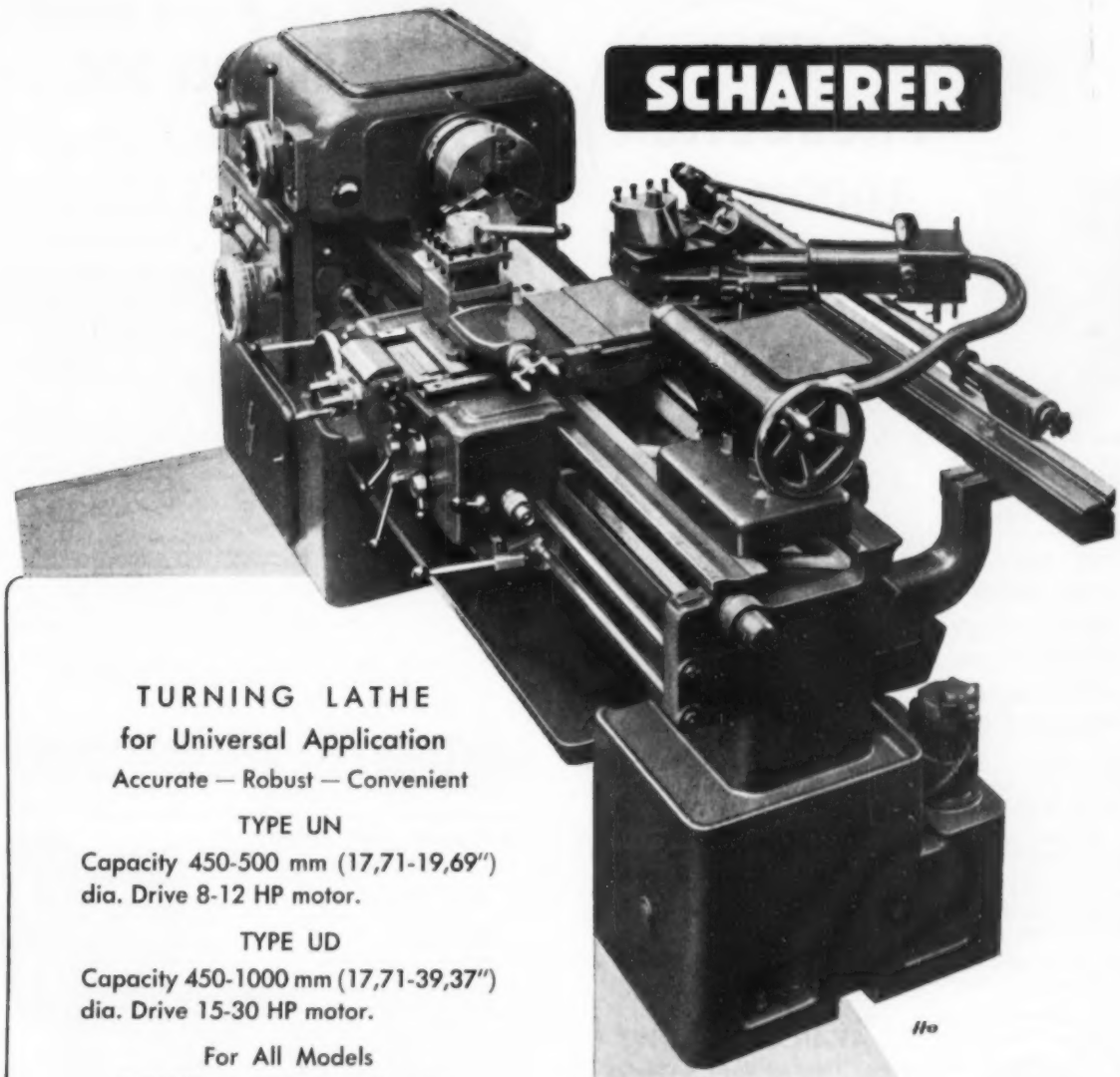

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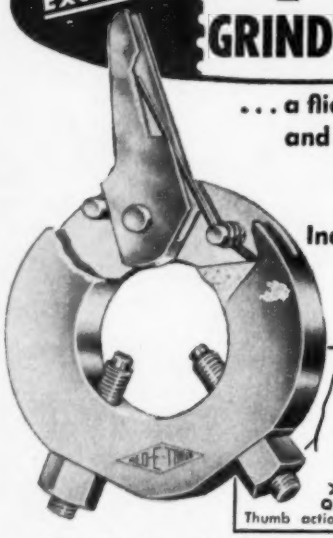

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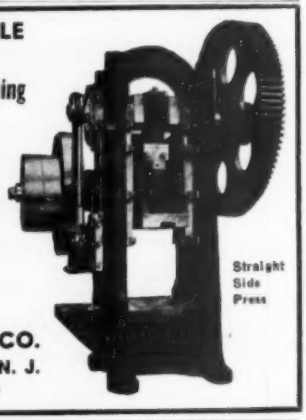

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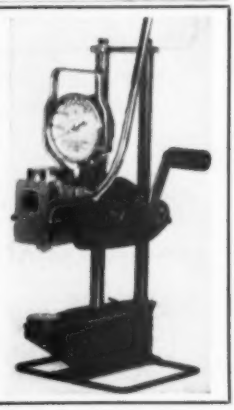

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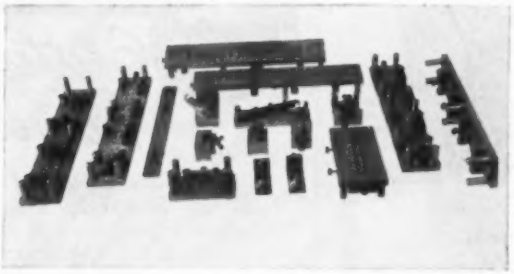
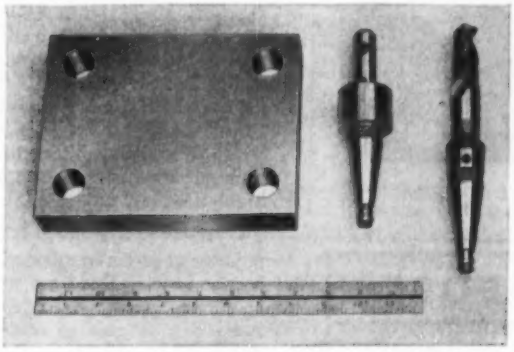


Manufacture of this group of drill jigs involves accurately locating, drilling and boring approximately 400 holes. The No. 1 Moore Jig Borer finished them to "tenths" in from five to seven minutes per hole.

ON PRODUCTION

64 holes to ±.0002"—2 minutes each on the No. 2 Moore Jig Borer



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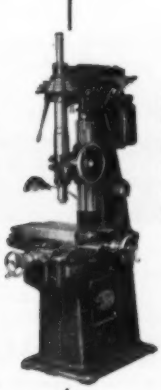

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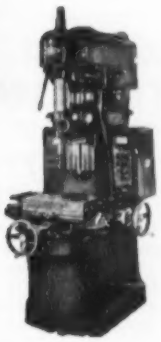

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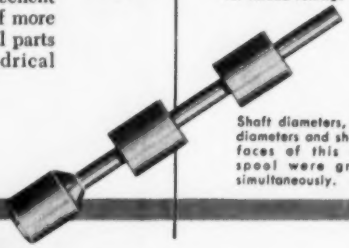
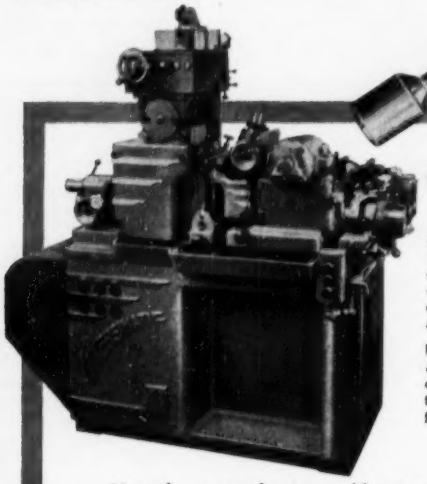
Profile of this A-N fitting was ground from the blank, establishing reliefs and correct diameter for thread rolling.



Shaft diameters, major diameters and shoulder faces of this valve spool were ground simultaneously.



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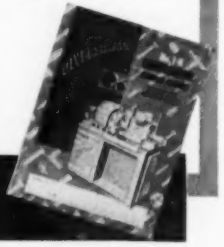

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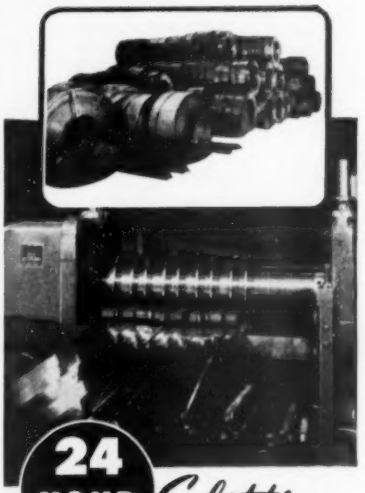

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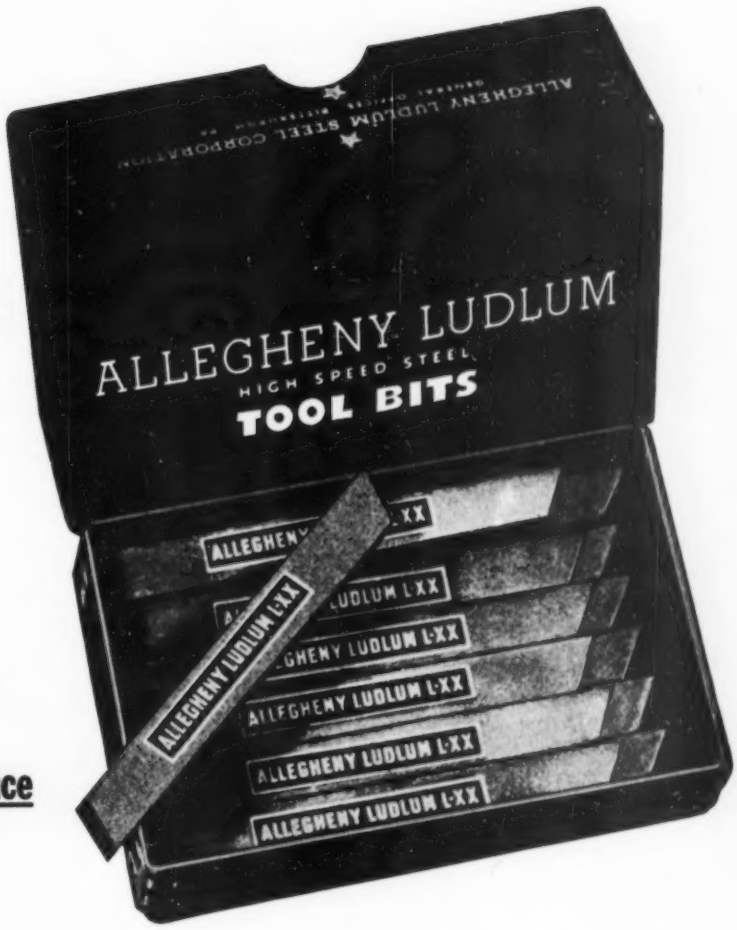

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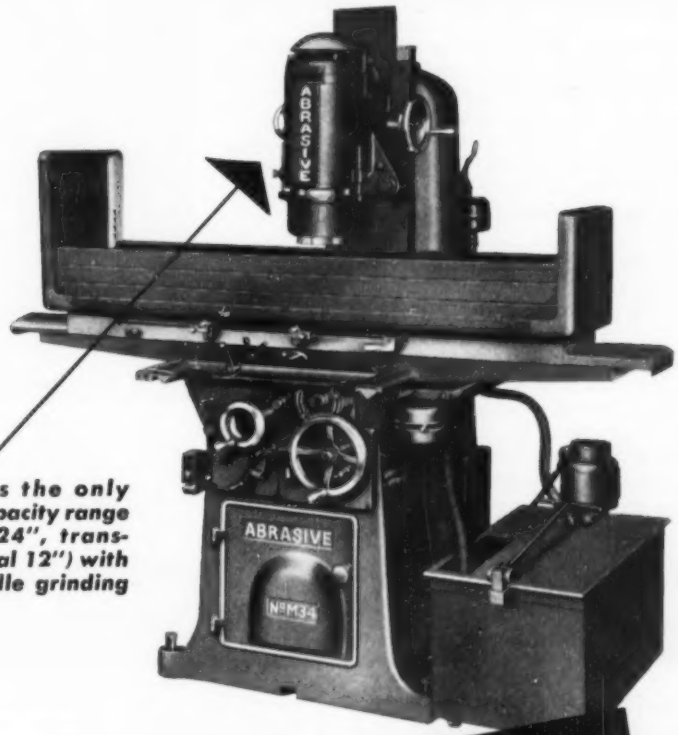

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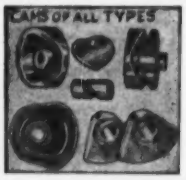

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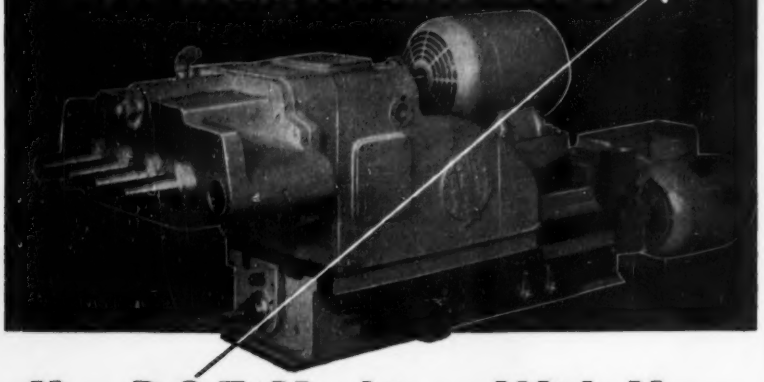

Use D&T Machines With New Mechanical Power Heads

Here are two good examples of special machine tools designed and built with D & T mechanical power heads. Shown above, is the No. 2 Roto-Matic 10 H.P. head. All sizes are operated through screw feed and have overload release clutch on the feed. Simplicity of design makes for less servicing and lower maintenance costs. D & T Roto-Matic power heads are readily adapted to countless special machine designs. For instance: Machine to the right is a 6 station indexing machine with 3 horizontal and 3 vertical power heads. Operations are drilling and reaming suspension holes and king pin holes in support arms for power heads.

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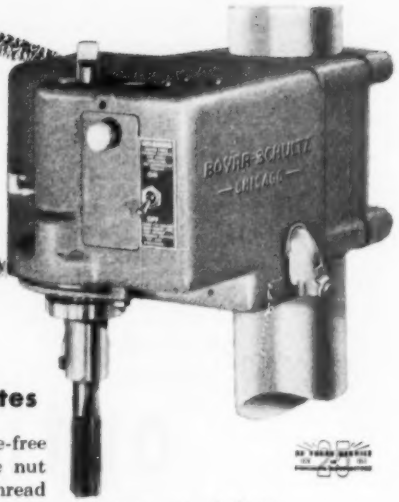

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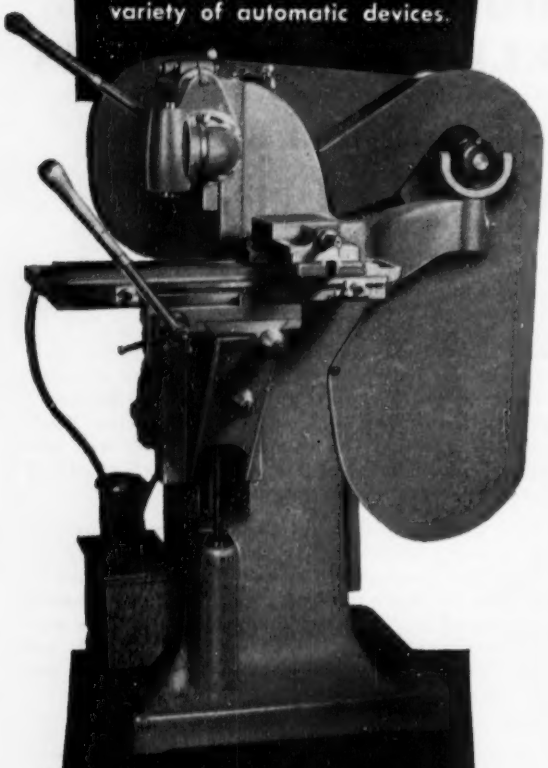

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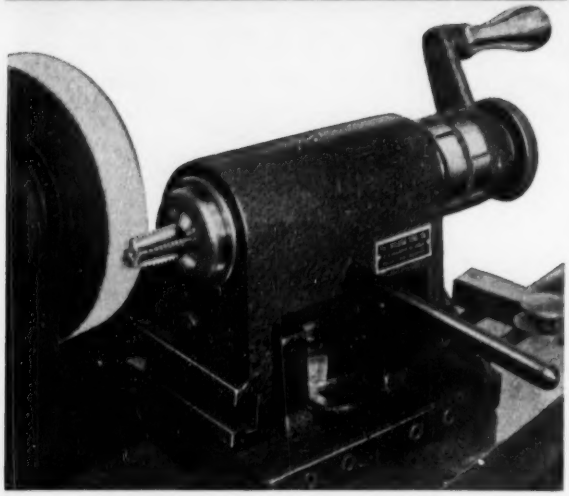

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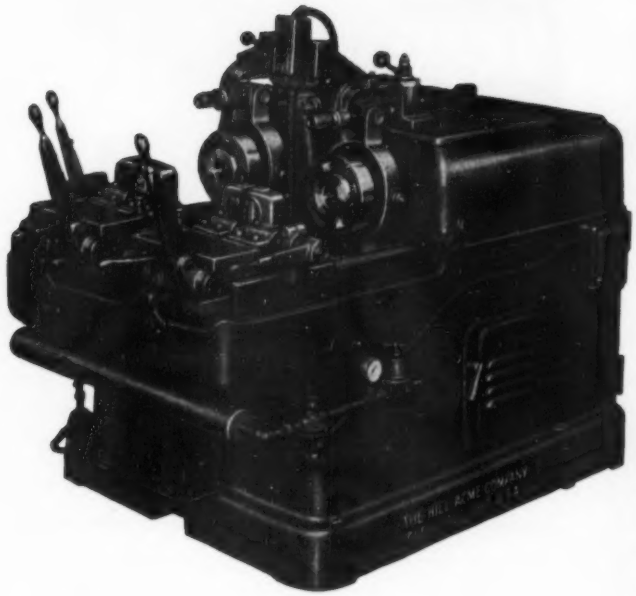

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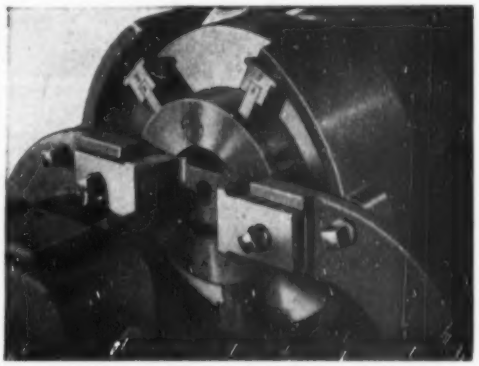

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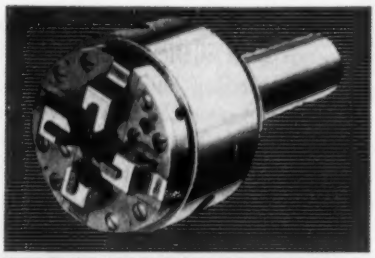
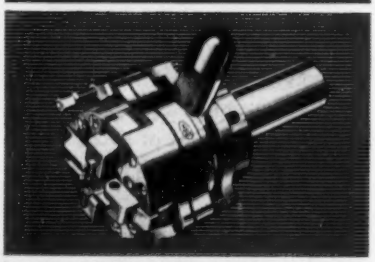


Style DMS
for hand screw machines, turret lathes, where die head does not rotate.



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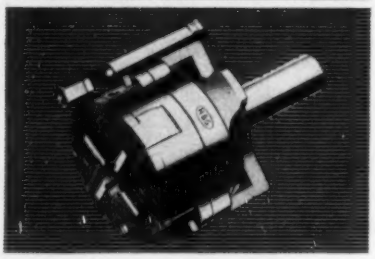
for B & S automatics and small spindle machines.



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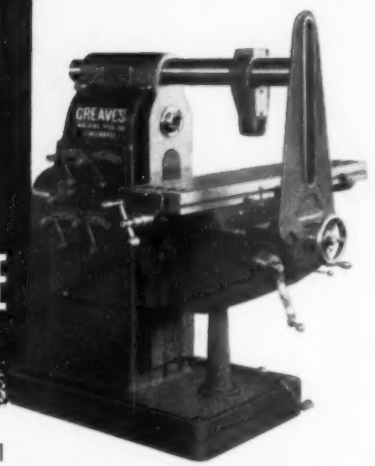

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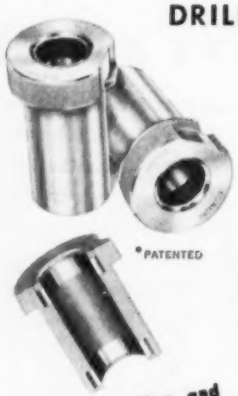

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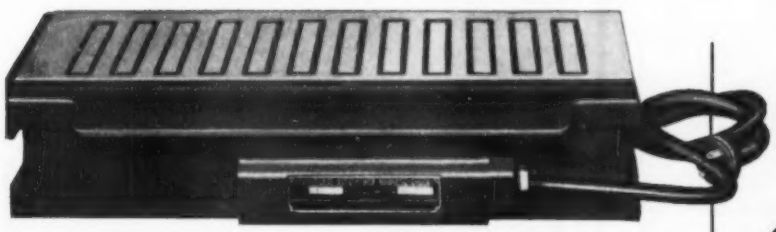

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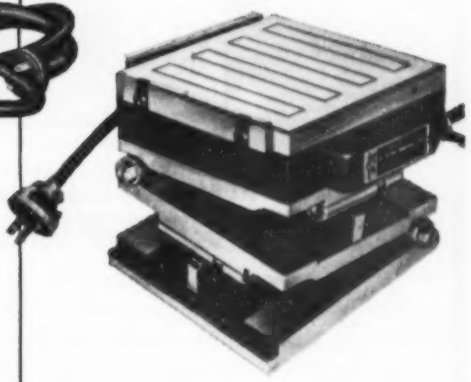
Pack *more* power in less space to increase versatility, speed, and safety of setups. Also available in fine mesh styles for securing extremely small or thin sections . . . or with longitudinal pole pieces for holding wide range of work-sizes.



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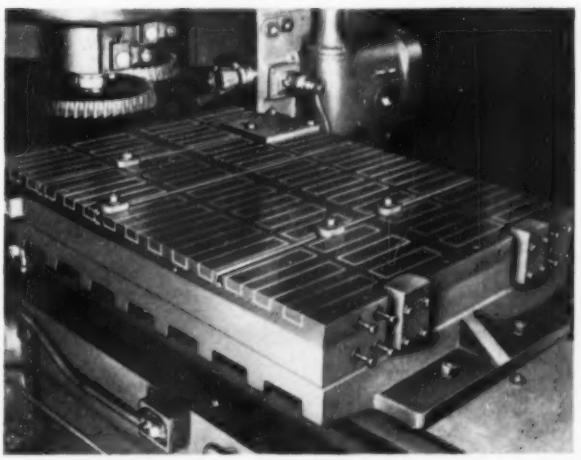
Speeds positioning of tricky angle grinding jobs. Gage blocks placed between roll and base plate assure high precision of compound angle setups. Typical of the wide range of Taft-Peirce adjustable magnetic chucks built to help make accurate setups faster.



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55½" x 40" chuck shown holds cast iron loomsides on a 75 HP milling machine, while three 18" carbide cutters and two 4" face mills take ¼" cuts simultaneously . . . at 30" per minute! Its greater holding power, smaller size, and high efficiency are typical of all T-P Superpower designs — whether special or standard models.

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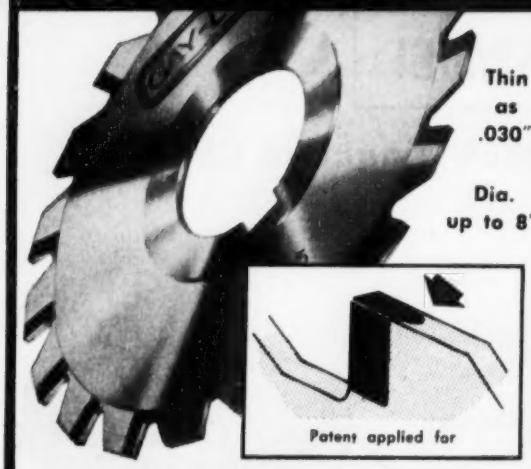

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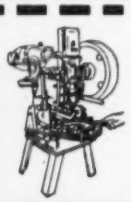

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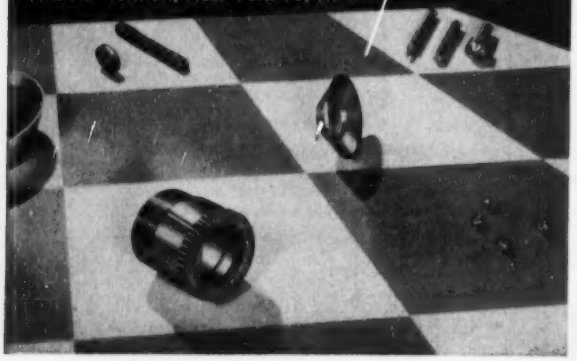

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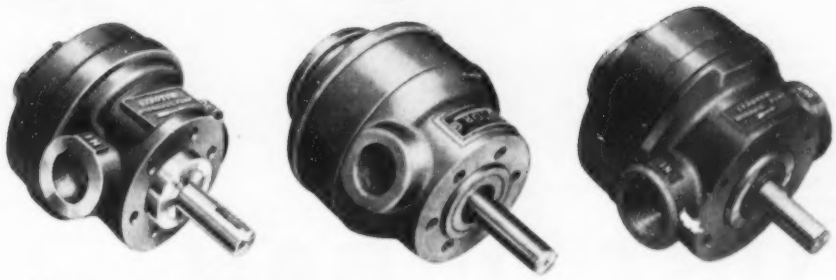

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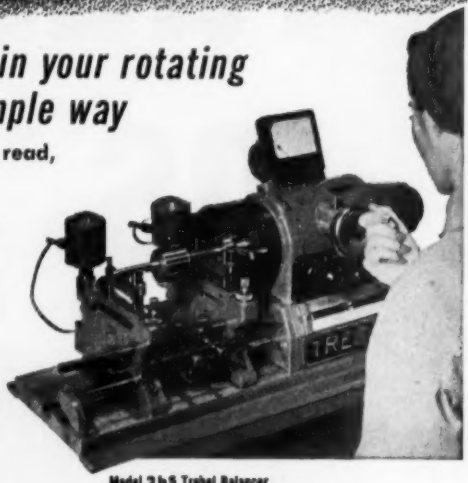

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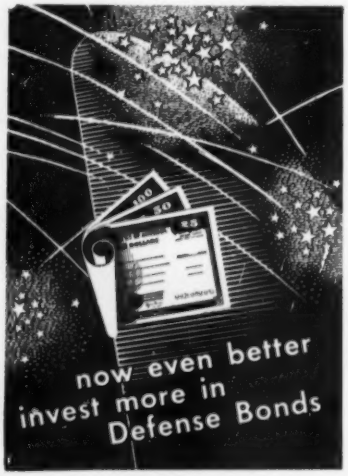

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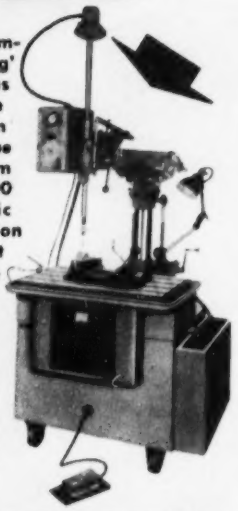

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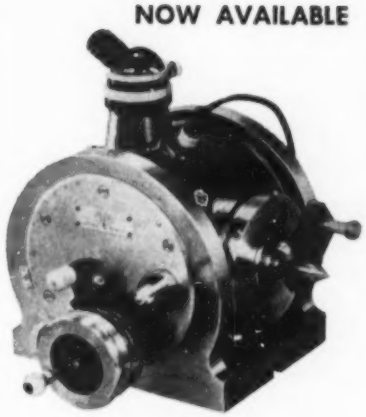

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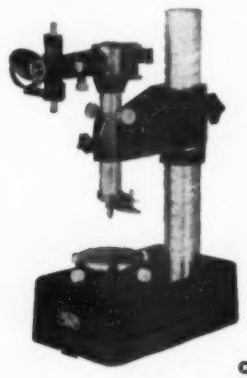

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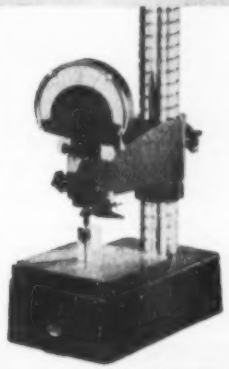

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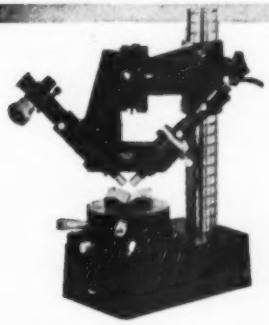
Precision indicating instrument. For checking dimensions by comparison with a standard gauge. Scale reads to .00005 in. Range ± .004 in.



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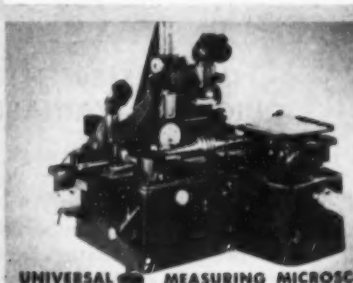

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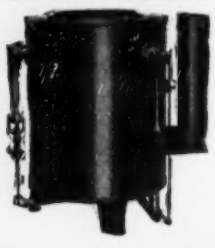

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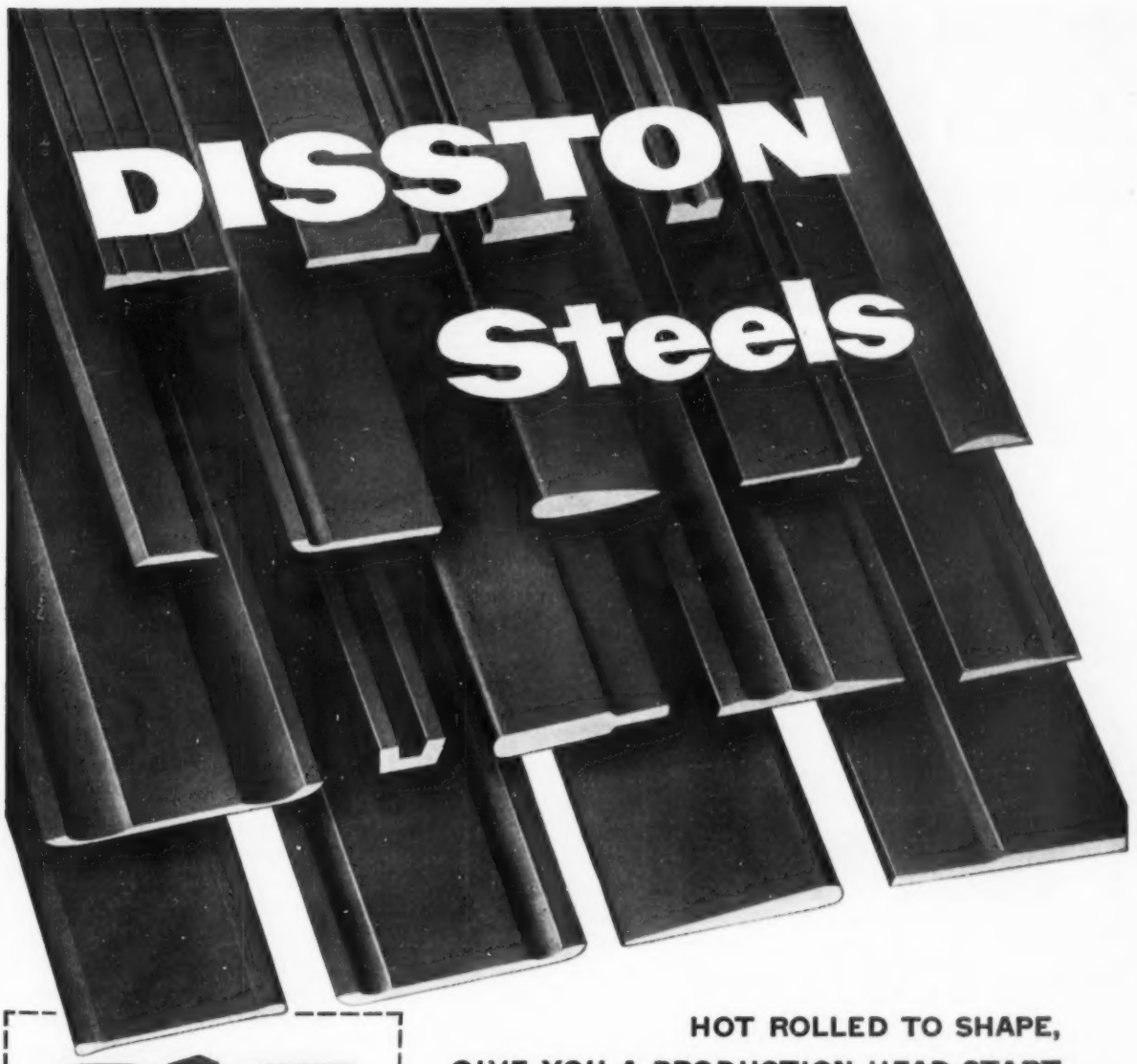

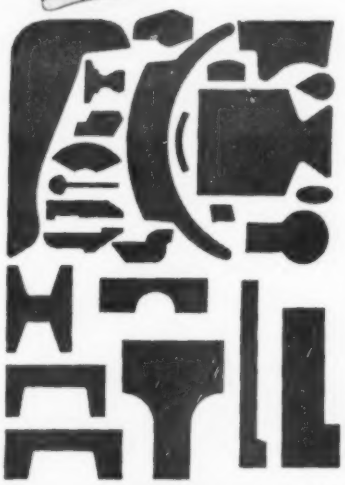

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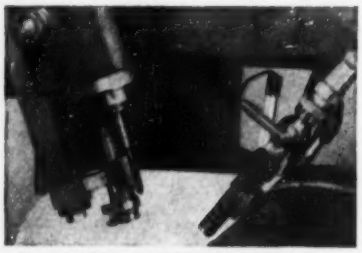

THE HEART OF PRECISION SHARPENING!
Photograph shows close-up of tap positioning mechanism of the Blake Flute Grinder.

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For a detailed explanation of the benefits of precision tap sharpening, write us for the recent *Machinery* article, "Why Taps Should Be Sharpened Precisely". It may prove an eye-opener! Descriptive bulletins on both Blake machines are also available at your request.

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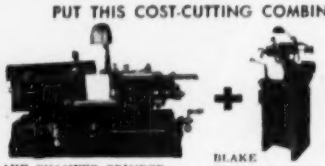

BLAKE CHAMFER GRINDER (Described in Bulletin 582)

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TAKE a man's pride in his job away, and there isn't much left; he becomes another automaton. Even a trained seal enjoys the applause as much as he does the fish.

WHEN you walk the tight-rope between close tolerances, or between good and bad finish, balance is vital. Be sure you have it, in machine-tool spindle or shaft, in tooling, in fixture. It will pay out in longer tool life and reduced scrap.

Microstructure determines tool life . . .

U. S. AIR FORCE MACHINABILITY REPORT 1951

This *American Machinist* Special Report summarizes recently released data from the $100,000 machinability - research project conducted by Curtiss-Wright and other companies for the United States Air Force.

You will find particularly valuable, as a key to estimating the tool life cutting speed of any steel, this report's comprehensive chart of 12 steel structures under four metallurgical conditions.

Copies of this 8-page Special Report, which includes information on machinability as influenced by heat-treating and alloying, are available at 15 cents each.

Write for an editorial reprint order form listing titles and costs of other informative Special Reports.

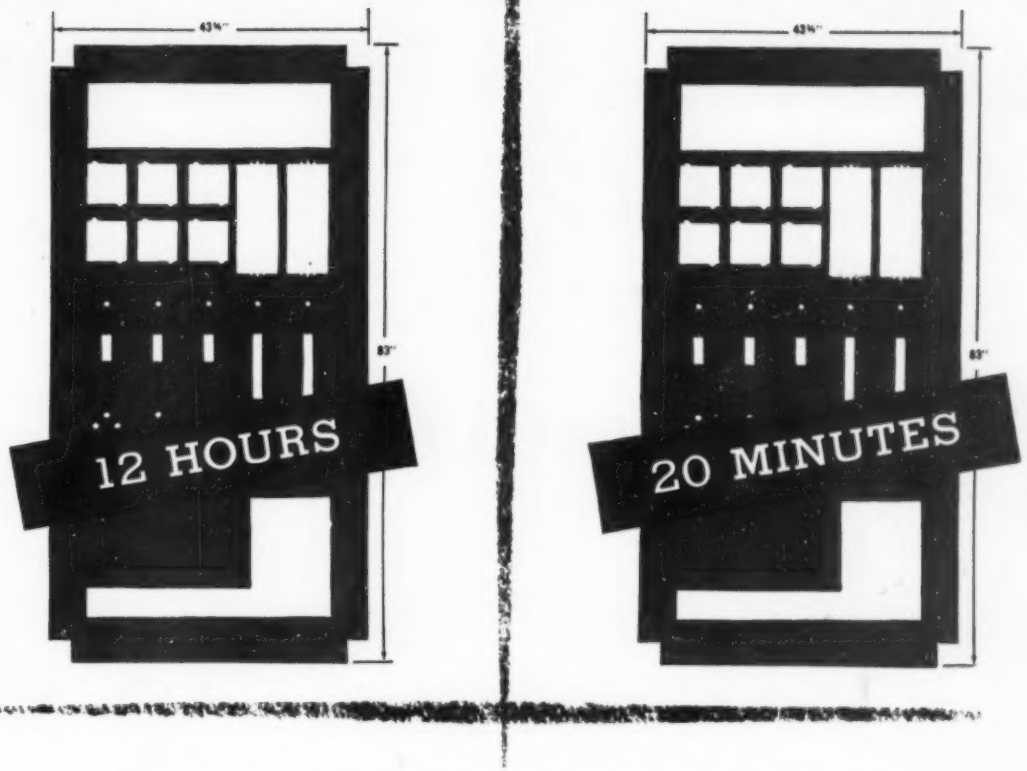
Reader Service Department

American Machinist

McGraw-Hill Building
New York 36, N. Y.

LOOK WHAT HAPPENED

when PENN Electrical Co. put in a WIEDEMANN!



On production of switchgear panels in lots of 1 to 10 of a kind, Penn Electrical Co., Irwin, Pa., reduced handling operations from 11 to 1, and eliminated layout and set-up time.

WHAT DOES THIS MEAN IN PRODUCTION SPEED-UP? The actual times shown above speak for themselves.

WHAT DOES THIS MEAN TO YOU? If you produce short runs of *any sized* pierced work, the Wiedemann method can give you similar savings.

HOW CAN YOU COMPARE? Just send drawings for a Wiedemann time study. No obligation, but it'll be an eye opener.

WIEDEMANN MACHINE COMPANY

4272 Wissahickon Avenue, Philadelphia 32, Pa.

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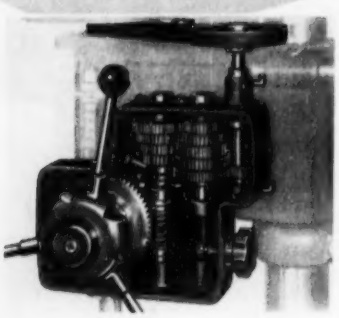

★ Drills 1" cast iron, ¾" steel ★ No. 3 Morse Taper, 6½" spindle travel ★ HEAVY-DUTY GEAR-DRIVEN POWER FEED TO TAKE FULL ADVANTAGE OF THIS BIG TOOL AND JOB CAPACITY.

An 18" *heavy-duty* drill press, with larger tool and job capacity, PLUS a *heavy-duty* GEAR-DRIVEN power feed to make effective use of its capacity — those are the brief facts about this fine new Clausing development.

The power feed, with its large heavy-duty gears, is positive and sure — NO belt slippage to reduce power. Feed selection is instant — BY DIAL — no belts to change. Add the Clausing features of new spindle bearing engineering, vernier depth stop, and exclusive head and table positioning mechanism — and you know this is a tool that can save you plenty on both set-up and operating time. Get all the facts — send for new literature today.

Atlas CLAUSING PRECISION MACHINE TOOLS — DIVISION ATLAS PRESS COMPANY KALAMAZOO MICHIGAN U.S.A.

CLAUSING DIVISION ATLAS PRESS COMPANY
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Methods,

process engineers . . .

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Helping to produce ever-increasing amounts of automatic controls for the nation's homes and industries.

The size of the task is immense—but it offers almost unlimited opportunity to the experienced engineer.

Right now we have quite a number of especially good openings.

Duties of the jobs. Figure ways to make quality products at minimum cost. Supervise the tooling, processing and planning necessary to transform blueprints into finished products.

Requirements. B.S. or M.S. in Mechanical, Electrical, Industrial or Chemical Engineering.

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Openings. In Minneapolis and Philadelphia.

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Honeywell

MINNEAPOLIS

First in Controls

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(Classified Advertising)

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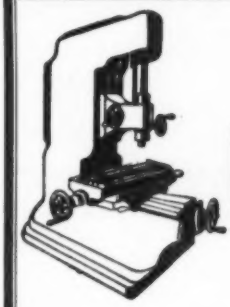

SEARCHLIGHT

Equipment Spotting

SERVICE

This service is aimed at helping you, the reader of AMERICAN MACHINIST, locate used and surplus new metalworking machinery and equipment not currently advertised. (This service is for user-buyers only.)

Just send in the specifications of the equipment wanted on the coupon below, or on your own company letterhead, to

Searchlight Equipment Spotting Service
c/o American Machinist
330 W. 42nd St., N.Y. 36, N.Y.

Your requirements will be brought promptly to the attention of the used equipment dealers advertising in this issue. You will receive replies directly from them.

NO CHARGE • NO OBLIGATION

Searchlight Equipment Spotting Service
c/o American Machinist
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Please help us locate the following used equipment:

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COMPANY .....

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4/13/53

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LAYOUT DRAFTSMAN
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Excellent opportunities for men who can qualify for these positions in our crane engineering division. Applicants should have experience in traveling crane or large equipment design and drafting. We offer many employee benefits in addition to excellent starting salaries. Openings on both day and evening shifts. All replies held in confidence.

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Write To

HARNISCHFEGER CORPORATION

4400 W. National Avenue **Milwaukee 46, Wisconsin**

YOUR **FUTURE** IS **YOURS** AT AS A

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- **WHO** will be working on basic design of metal working and hydraulic machinery . . .
- **AT** one of the leading manufacturers of machine tools and hydraulic equipment . . .
- **IN** Rockford, a friendly city within 90 miles of metropolitan Chicago.

This will be a permanent position with a highly progressive company, having substantial insurance and pension programs. . . . Send us a post card asking for an application.

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Executive Engineers 8 to 15,000. Designers—all kinds to 12,000. Tool Designers—Engineers 6 to 12,000. Detailer, Draftsmen and Trainers—Highest Pay—FREE. Employers pay our fees on the above. We also place all types of manufacturing executives, office and sales executives.

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SALARY START TO $8400

Mfg. of home appliances (650 Employees) seeks a research and development M.E. with good potential.

ASK FOR RAY EDWARDS
O'SHEA EMPLOYMENT SYSTEM
"America's Largest"
64 E. Jackson, Chicago, Ill. Tel.—WAbash 2-1884

FOREMAN

Eastern firm is looking for a competent Foreman who has a thorough knowledge of all types of Gearing, both theory and practical. Write stating education, experience, references and salary desired.

P-6944, AMERICAN MACHINIST
330 W. 42nd St., New York 36, N. Y.

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With creative ability and a sincere interest in stable employment wanted by a medium size well-known machine tool company. Openings exist in research, machine design and equipment design divisions due to present and projected design of new products. Applicants with working knowledge of machine hydraulics, servo-mechanisms and electrical components desired. Company is located in a pleasant, progressive New England village having good recreational facilities, modern schools, hospital, etc. Excellent working conditions and congenial atmosphere. Send resume to

P6606, AMERICAN MACHINIST
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Diamond Wheel and Grinders

Expanding to Nationwide Coverage. We will need sales representation in several choice territories. Write for details of our excellent proposition.

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REPLIES (Box No.):
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CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

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MECHANICAL ENGINEER for Product Engineering. Man with background in roller chain manufacturing or similar products. Excellent opportunity. Replies will be kept in strict confidence. P-7245, American Machinist.

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MANUFACTURER'S REPRESENTATIVE wanted to represent short-run stamping firm. Good commission potential—exclusive territories now open in western half of Pennsylvania, Texas, Oklahoma,—northern half of Calif., including San Francisco,—also large part of Michigan. RW-7366, American Machinist.

MAN WANTED to cover Industrial Accounts for well-known established Electrical Wholesaler located in Brooklyn. Part time or full time. Must have active accounts. Electrical experience not necessary. Drawing and expenses against commission. RW-7231, American Machinist.

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SALARIED POSITIONS $3,500 to $35,000. We offer the original personal employment service (established 43 years). Procedure of highest ethical standard is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars. R. W. Bixby, Inc., 266 Dun Bldg., Buffalo 2, N. Y.

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1953 Stock List of New & Rebuilt Motors, Generators, Transformers & other electrical equipment. Ask for it without cost from Electric Equipment Co., 63 Curlew St., Rochester, N. Y.

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East North Central
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For selling the
NEWMAN GRINDING WHEEL DRESSERS

This is excellent territory for live wire experienced abrasive men.

L. NEWMAN
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Manufacturer has some available time for straight cut beveled gear work running from 1½" to 20", depending upon ratio, 4 pitch to 24 pitch. Equipped to handle coniflex or straight bevel tooth if required.

SIER-BATH GEAR & PUMP CO., INC.
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On grinding of steel flat shapes. Particularly interested in large runs where customer furnishes raw or partially finished material, where grinding only, is required.

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up to 80" Dia.

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738 So. 13th St., Newark 3, N. J.

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For Greater Efficiency and Better Grinding Results Have *DI-TRU* Reset Your Worn Diamond Tools.
Same Day Service
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ALL METALS
Also special screw machine products to order
EASTERN
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H & G DIE HEADS

"PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Let your pattern problems up to us—we will take care of them
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BLANCHARD
Up to 84" Diam.

PLANE SURFACE
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DOUBLE DISC
All Shapes — All Materials

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Infeed — Thruffed Shoulder and Bar

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Up to 16" x 80"

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Flat Lapping — Up to 10 Inches
Surface Finishes — From 1 to 5 Rms or Less
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ALL SHAPES — ALL MATERIALS
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- We can produce parts for anything in small or large quantities at reasonable prices.

55 machine tools at your service.

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GENERAL MACHINE PRODUCTS COMPANY
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WE CAN SUPPLY YOU WITH ALL YOUR MACHINE TOOL NEEDS

OVER 30 YEARS EXPERIENCE

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5/16" No. 00G Brown & Sharpe
1¼" Conomatic 8 spindle
3¼" & 3¾" Cleveland Mod. A
7½" Baird 6 spdl. chucker
14"x33" & 20"x25" Fay
Gisholt Simplimatics
8" 6 spindle Bullard "A" Multaumatic

BROACHES

5 ton, 40" Foote Burt duplex surface
10 ton, 56", No. 3XA Oilgear
12 ton, No. V2 American vertical
15 ton 36" Colonial vertical surface
15 ton, 48", No. H10-48 American
18 ton, 42", No. V42 American

SHAPERS

24" American Auto-Oiled
26" Smith & Mills back geared
26" Morton draw-cut.

LATHES, ENGINE

12"x30" Hendey Yoke head
14"x6' Pratt & Whitney
14"x6' Lodge & Shipley
16"x36" Sundstrand Rockford
18"x8' Hendey Yoke head
24"x12'—13' & 14' American

COMPLETE MACHINERY SERVICE

GEAR CUTTERS

Type A & No. 12 Barber Colman
Nos. 1 & 5A Lees Bradner
No. 12H Gould & Eberhardt
16" Cincinnati hobber
24", No. 3 Farwell hobber
No. 130 Cleveland Rigidhobber
72" Schuchardt & Shutte hob
72" Westinghouse hobber
4" Gleason spiral bevel
No. 13 Gleason gear tester
10" Pratt & Whitney gear grinder
8" & 12" Red Ring gear shavers
24"x12" Fiather auto. spur
Cimatool tooth rounders

GRINDERS

10"x36" Norton Semi-Auto.
No. 2 Cincinnati centerless
21", No. 6-21-1 Besly opposed disc
22", No. 228 Hanchett opposed disc
23", No. 84 Gardner opposed disc
No. 120 Gardner, 1946
53", No. 24 Gardner Horizontal disc
No. 72 Heald Sizematic & Gagematic
Nos. 5, 16A, 16-28 & 24-36 Bryant
No. 42 Van Norman radius
8"x24", No. 78 Wilmarth & Morman
No. 2 Brown & Sharpe universal

MONEY BACK GUARANTEE

LATHES, TURRET

1" No. 2 Warner & Swasey
1½" No. 3 Bardons & Oliver
1½", No. 601DD Oster
2" No. 5W Acme Universal
2¼" No. W. & S., motor in base
36" Rogers vertical
36" Bullard New Era vertical
No. 4 Warner & Swasey, power feed
3½" x 18" Libby International universal saddle type, power rapid traverse

MILLERS

No. 4-36 Cincinnati Hydromatic
No. 4-48 Cincinnati Hydromatic
No. 2 Cincinnati plain late
No. 36 Van Norman universal

MISCELLANEOUS

AIR COMPRESSOR. 194 CFM Ingersoll
PAPER SHREDDER. M & M "Air Fluff"
OIL EXTRACTOR. No. 501 Barrett
ROD POINTER. Type KK Economy Auto.
BORING MILL. 4" D. & H. floor type
BORING MILL. 72" N.B.P. vertical
COMPARATOR. 20" Portman
HONES. Nos. 172 & 2610 Barnes
KEYSEATERS. Nos. 3 & 4 Mitts & Merrill
PLANER. 30"x30"x10' Cincinnati
PLANER. 36"x36"x10' Niles Bement Pond
SWAGER. No. 4 Torrington

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Phone Saginaw 2-3105

Botwinik

Bargains & Buys

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(New) Model AF 5" and 6" bar Floor Type Horizontal Boring Mills—Plain or swivel heads—Outboard supports—MD

Fisher 5" bar Floor Type Horizontal Boring Mill—Horizontal spindle travel 50"—Vertical movement of head 55"—MD—Late Type

Bullard 54" "Spiral Drive" Vertical Turret Lathe—Side head—4-jaw chuck table—MD

Betts 8' Vertical Boring Mill—2 swivel heads—69" under cross rail—Actual swing 108"—MD

GEAR CUTTERS

Gould & Eberhardt 96"x30" Automatic Spur & Helical Gear Generator—Auxiliary Table—Power Feeds—MD

Pfauter No. 5 (144"x22") Automatic Spur, Helical & Worm Gear Generator—with end milling attch. for herringbone gears—MD

PRESSES

V & O No. 1, 2½, 3½, and 4 OBI Power Presses—All MD—Some with Reeves drives and roll feeds—Late type

Lempco 50 Ton "Hyper Matic" High Speed—Stroke 3"—Die space 18"x18¼" Speed to 1000 strokes/min.—MD—Late Type

Beatty No. 11B 350 Ton Punch Press—Stroke 3"—Wt. approx. 36 Tons—MD—1945 machine

Watson-Stillman 100 Ton Horizontal Forcing Press—Ram stroke 18"

This is only a partial listing of our huge stock of Machine Tools of every make and description.

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America's Foremost Machine Tool Rebuilders

Botwinik Brothers of Mass. Inc

3 SHERMAN ST. WORCESTER, MASS.

New "SEARCHLIGHT" Advertisements

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AMERICAN MACHINIST

330 W. 42nd St., New York 36, N. Y.

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10 WARD ST.
ROCHESTER 5
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Every Item Guaranteed as Represented

AUTOMATIC, #00G Brown & Sharpe, M.D.
AUTOMATIC #6 B & S Wire Feed Screw, Late.
AUTOMATIC, Cleveland Model #B-1½" Spl. Spdl.
AUTOMATIC #2 B & S Wire Feed, 1" screw, Late.

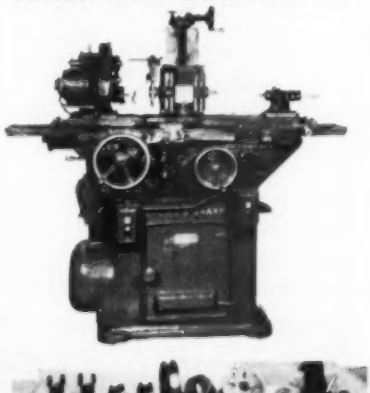
BALANCER, Andersen Bros. 14"x64", Roto-Checker.
BORING MILL, 24" Bullard M.D., V.T.L.
BORING MILL, 36" Bullard M.D., V.T.L.
BORING MILL, 36"x44" Niles Vert. M.D., Side Head.
BORING MILL, 2½" Lucas Horiz., M.D.
BORING MILL, Lucas Horiz. 3" Bar, M.D.
BORING MILL, Giddings & L. #0 Horiz. 3½" Bar.
BARRELS, Tumbling Lupomatic, Schutte & Koetring.
BRAKE, #335 Chicago, M.D., Press, 6' 14 ga., NEW.
BRAKE, #185 Chicago Power Apron, 8'x3/16" cap.
BROACH, #3 LaPointe Horiz. 50" Str., M.D.

COMPRESSOR, Ingersoll Rand ER-1, 10 HP, M.D.
COMP., 15 HP, 10 HP, Gardner Denver, M.D., New
COMPRESSOR, C-P 50 HP, M.D., 10x10, 278 CFM
COMPRESSOR, Ing.-Rand ER-1, 100 HP Syn. M.D.
CRANE, OET Ricker 2 tons 11'9" span.
CRANE, Canton #8 Portable Gooseneck 3 ton cap.
CHIP WRINGER, 26" Tolhurst M.D., Late.
GAS CUTTER, Airco #4 & #10 DB Radiagraph.

RADIAL DRILL, 3' 9" Mueller, M.D.
RADIAL DRILL, 3"x7" Canedy-Otto Cincinnati, New.
RADIAL DRILL, 4'x11" American, M.D.
RADIAL DRILL, 5'13" Cincinnati-Bickford, M.D.
RADIAL DRILL, 6'x15" Cincinnati-Bickford, M.D.
RADIAL DRILL, 30" Walker Turner M.D., Late.
DRILL, Foodick 16", S.S. Power Feed, M.D.
DRILL, #2 Colburn H.D. #4 M.T., M.D.
DRILL, #121 Baker Auto. S.S. Cam Operated.
DRILL, Deep Hole, Avey-Draulic #2, M.D.
DRILL, Edlund #2B, 3 spdle. #2 M.T., 16"
DRILL, 4 & 6 Sp. Avey 12" overhang, #3 M.T., M.D.
DRILL, 4 Sp. Barnes H.D., M.D., #4 M.T., P.F.
DRILL, Cincinnati 21" with Tapping Attach. M.D.
DRILL, Natco Multiple Spdle. #12, #1 M.T., M.D.
DRILL PRESSES, Leland Gifford #1MS, 1, 2, 3, 4.
DRILL PRESS, #2MS Buffalo Forge single spindle.
DRILL, Barnes, 24" S.S. #4 M.T., 1¾" cap.
DRILL PRESS, #25 Foote-Burt S.S. 24", #5 M.T.
DRILLS, #14, #15, #16, #18 Buffalo Forge, M.D.
DEEPFREEZE Motor Products 40 below zero.
DEMAGNETIZER, SB-811 Magnflux, late type.

FACING HEADS, 28" & 24" Mummert-Dixon.
FILER, #11-S Cochrane Bly Auto Saw Filer.
FILER, Type P4, Oliver Floor Type, M.D.
FURNACE, Westinghouse Elec. 18 KW, 2100° F. cap.

FURNACE, Machler Steam Oven, Serial #3543.
GRINDER, M.D. Sanford Surf. 8"x12" cap., New.
GRINDER, #1 Wilmarth Norman Hand Surf., 6"x12".
GRINDER, #2 Imperial Univ. Tool & Cutter, New.
GRINDER, #2 Brown & Sharpe Sur. 6"x18" cap., M.D.
GRINDER, #4 G & L Univ. Tool & Cutter, M.D.
GRINDER, Diss. Besly #205, 18" Dble End.
GRINDER, Heald Rotary #25, M.D. 16" Cap.
GRINDER, Cylindrical, Norton 10"x24", M.D.
GRINDER, Brown & Sharpe #4 Univ. 12"x60".
GRINDER, #13 B. & S. Univ. Tool & Cutter.
GRINDER, Thread, Jones & Lamson #TG-615, Late.
GRINDER, Thread Jones & Lamson #TG848, Late.



#13 BROWN & SHARPE Universal Tool Grinder, Motor Driven.

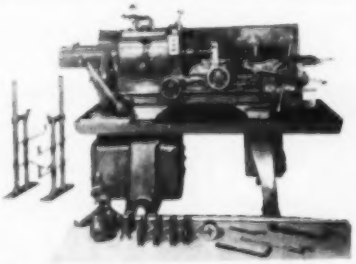
GRINDER, Heald #72A-3 Internal Size-Matic.
GRINDER, 14"x36" Pratt & Whitney Vert. Surf.
GRINDER, Pratt & Whitney 22"x84" Vert. Surface.
GRINDER, Greenfield #12 Int. Hydromatic, M.D.
GRINDER, Oliver Auto. M.D. Drillpointer, #310.
GRINDER, #33 Abrasive Vert. Auto. Surface, M.D.
GRINDER, #22 Heald Horiz. Rotary Surface, M.D.
GRINDER, Diamond Snagging 10 HP, 24"x4½".
GRINDER, Norton 6x18 Vert. Surface, Hyd. Late.
GRINDER, #60 & #70 Heald Internal.
GRINDER, Landis 6"x18" Hyd. Cyl. late type, M.D.
GRINDER, Sellers Type #1A Tool, 24" wheel.
GRINDER, 37" Wheel Dia. Osterheim Disc, 24" cap.
GRINDER, 30" Ingersoll Tub Face Mill, M.D.
GRINDER #79-72" Gardner Vert. Spindle, Late.
GRINDER, #214—30" Besly Double End Disc, Late.
PROFILE GRINDER, Studer Type PSM, M.D., late.
GEAR SHAPER, Fellows #6 High Speed, M.D.
GEAR SHAPER, Fellows #7 High Speed, M.D.

HAMMER, Rochester Hispeed, all sizes, M.D.
HAMMER, Bradley 200# Rubber Cushioned Helve.
HEADER, Manville #1 S.S.D.D. Cold 5/16".
INDUCTION HEATER, 15 KVA Ecco Hi Frequency.
INDUCTION HEATER, 30 KW Lepel, Late Type.
AIR MOTOR HOIST, Ingersoll Rand 2000# cap.
ELECTRIC HOISTS, 500-4000 lbs. Whiting, NEW.
HONE, #194 Barnes Vertical, M.D., Hyd. Late.

KEYSEATER, #5 Mitts & Merrill, Giant, M.D.
LAPPER, 2F Norton Vert., M.D., late type.

No. 7 BARDONS & OLIVER
Geared Head

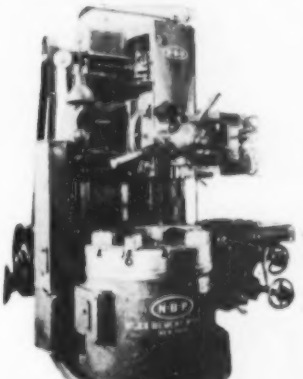
Full Universal Turret Lathe, Presselector Head, Bar Feed, 4" capacity through spindle, Late Type, Motor Driven.



#2 WARNER & SWASEY Geared Head Turret Lathe, 12 Spindle Speeds, Bar Feed, Motor Drive.

LATHE, Lo-Swing 8"x168", M.D., A.C. Rebuilt.
LATHE, Porter-Cable 9'x15" Geared Head Prod.
LATHE, 12" Reid Smallpiece Production, Late Type.
LATHE, Hendey 12"x5' Q.C.G. Taper Attach. M.D.
LATHE, LeBlond 14"x6', Q.C.G., M.D.
LATHE, Hendey 14"x8' Q.C.G. Taper Attach. M.D.
LATHE, American 16"x8' Q.C.G., Grd. Hd. M.D.
LATHE, Lehman 18"x7' Q.C.G., M.D.
LATHE, American 18"x10' Q.C.G., Grd. Hd.
LATHE, South Bend 18/28"x8' Gap Bed, Q.C.G. M.D.
LATHE, Reed-Prentice 20"x10' Grd. Hd. M.D.
LATHE, LeBlond 22"x10' Q.C.G., M.D.
LATHE, 24"x12' Boye & Emmes Gd. Hd., T.A., Late.
LATHE, Putnam 23/32"x12' Q.C.G., M.D.
LATHE, LeBlond 24"x14' Q.C.G., Grd. Hd.
LATHE, Lodge & Shipley 26"x14', Q.C.G., M.D.
LATHE, Bridgeford 27"x12' Geared Head, M.D.
LATHE, 27"x16' Niles Timesaver, Grd. Hd., M.D.
LATHE, Bridgeford 32"x16' Q.C.G., Grd. Hd.
LATHE, 42"x18' Pittsburgh Geared Head, M.D.
LATHE, Bullig Dble. End #VMT5, Devine Bros.
LATHE, Turret #1 Bardons & Oliver Electric Head.
LATHE, Turret, #2 Simmons Vari Drive 220 V.
LATHE, Turret #2 W & S Univ. Grd. Hd., Late.
LATHE, Turret, #4 Warner & Swasey Univ. 1½"
LATHE, Turret #4DE Potter & Johnston Auto., 1942.
LATHE, Turret #6 Warner & Swasey Grd. Hd. Rem Bar Feed, Motor in base.
LATHE, Turret #7 Bardons & Oliver, 4" cap., Late.
LATHE, Turret #2 Cinci. Ajmo Univ. Geared Head.
LATHE, Turret, #3A Warner & Swasey Univ. M.D.
LIFT TRUCKS, Baker 1 & 2 ton, Platform & Fork.

MILL, #4 Burke Motor Driven, Late, M.D.
MILL, #2 Pratt & Whitney Prod. Duplex, M.D.
MILL, #3VB Hardinge Vert. Bench, M.D.
MILL, #4B Brown & Sharpe H.D., Horiz. M.D.
MILL, #14 Garvin Plain Horiz., M.D.



36" x 44" Niles Vertical Boring Mill, Side Head, Motor Driven.

MILL, #0Y Brown & Sharpe Plain Horiz., M.D.
MILLING MACHINE, #2B K & T Horiz., M.D.
MILL, Cinci. Horiz. #3, #4, #5 High Power, M.D.
MILL, #1 Brown & Sharpe Plain Horiz., M.D.
MILL, #0-8 Cinci. Vert. Prod. Late, M.D.
MULT-MILLER, U.S. Tool #MM-1-G Auto. Prod.
MILL, #0 Douglas Plain Horiz. M.D., Coolant.
MILL, #0 Sundstrand Rigidmil Hyd. Late Type.
MILL, #0 Vernon Hand Mill, M.D., Late.
MILL, 2A Brown & Sharpe Horiz. Univ., M.D.
MILL #2BP Van Norman Horiz. M.D., Late.
MILLING MACHINE, Kempsmith #2 Horiz. Univ.
MILL, #3 Cinc. Univ. Horiz., M.D.
MILLING MACHINE, LeBlond #4 Horiz. Univ.
MILL, #2 Vert. M.D. Brown & Sharpe.
MILL, #3 Cinci. Vertical Hi Power, M.D.
MILL, #2SC Becker Vert. Die Sinker, M.D.
MILLING MACHINE, #2 Van Norman Duplex, M.D.
MOTOR GENERATOR SET, Gen. Electric, 100 K.W.

THREADING, Staybolt Lassiter Millholland 1½".
THREAD MILL, 7½x11 Hanson-Whitney, Univ.
THREAD MILL, 6x14 Pratt & Whitney No. 1105.
THREAD MILLER, Lees-Bradner #40A Automatic.
THREAD MILLER, Pias-O-Mill #3 Planetary Form & Thread Semi-Automatic Milling Machine, Late.

PAPER SHREDDER, No. 10 Mitts & Merrill, M.D.
PLANER, Cincinnati 30"x30"x12' A.C., M.D.
POWER PRESS, Bliss #164 Open Back, M.D.
POWER PRESS, Bliss #1A S.S. Dble. Crank Grd. 45 tons, 4" stroke, 36"x26" Bed Area, M.D.
POWER PRESS—Bliss-Consolidated #103-B Straight Side Dble. Crank 45 tons, M.D.
PRESS, #5 Johnson OBI, 56 tons, new.
PRESS, #7 & #8 Johnson OBI 75 & 90 tons, New.
PRESS #103 Toledo Toggle Drawing, M.D.
PRESS, 135 Ton Clearing Single Crank 8" Str., Late.
PRESS, 70H Drake Hyd. Arbor, New.
PRES. 78½ Bliss S.S. 9½ Str. M.D.
PRESS, Federal #2 O.B.I. Grd. 2" Stro.
PRES. Bliss #18, #19, #20, #21, OBI, A.C., M.D.
PRES. Waterbury-Farrel High Speed 60 tons #5W.
PRESS, 60 C Bliss Double Action, 3 crank.
PRESS, Lucas 15 tons Power Arbor, M.D.
PRESS, #68 Whitney Deep Thr. 24", feet.
PRESS, P2, P3 Ferracuts M.D. Roll feed.
PANTOGRAPH, #1A Gorton M.D. Engraving.
PUNCH, #48 Buffalo Forge Vert. Cap. 1"x1½" M.D.
PUNCH, R-4 Wiedemann Turret, 10 Stat. 24" thr.
PUNCH, Hasker Turret, 8 station, cap. 2½" hole.
PUNCH, H & J #2 Sgle. End, 24" Thr. 1" thru 1".
PUNCH, H & J #4, 48" thr., with Shear Blades.

RIVET SETTER, ⅝" cap. Pene. Tubular Rivet.
ROLLS, Bertsch Pyramid 18'x1¼" cap. M.D., La'e.
ROLLS, #1 Buffalo Forge Wrapping M.D.
ROLLS, 72"x¼" Lown Initial M.D., New.
ROLLS, #2 Buffalo Forge Vert. Angle, Bending, New.

COLD SAW, Wagner 10"x10" cap., M.D.
COLD SAW, Espen-Lucas #700, 48" dia. blade, M.D.
CUT-OFF SAW, Yates-American #M-90, M.D.
SAW, #48 Marvel Hack Saw 6"x6" Cap., M.D.
SAW, #20-C Racine Shear Cut 6"x6" cap., M.D.
SAW, Band Tannewitz GH-36" High Speed, M.D.
SAW, V-26 DoAll Contour Band, Late.
SHAPER, 15" Pratt & Whitney Crank, M.D.
SHAPER, 20" Rockford Univ. M.D., Tilting Table.
SHAPER, C & E 24", high duty, back geared, M.D.

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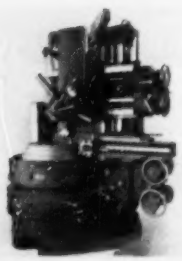

38/44" Niles-Bement-Pond Vertical Turret Lathe, side head, p.r.t., 4-jaw chuck table a.c. m.d.

LATHES

12"x84" ctrs American Grd. Hd., a.c. m.d., taper
20"x45" ctrs Lodge & Shipley Selec. Grd. Hd., a.c. m.i.l.
20"x72" ctrs Lodge & Shipley Selec. Grd. Hd., a.c. m.d.
22"x74" ctrs Lodge & Shipley Selec. Grd. Hd., a.c. m.d., taper
24"x60" ctrs American Heavy Patt. Grd. Hd., a.c. m.d., taper
36"x96" ctrs Schumacher & Boye Triple Grd., cone, taper
36"x120" ctrs American Grd. Hd., a.c. m.d., taper

MILLING MACHINES

No. 1-14 Kent-Owens Hydraulic, late
No. 3 Kearney & Trecker Standard Universal, m.i.b., d.o.a., p.r.t., div. hds.
No. 4 Cincinnati High Power Universal, a.c. m.d., div. hds.
No. 4-B Brown & Sharpe Heavy Plain
No. 1224 Milwaukee Simplex, Ma.c. m.d., late type

GRINDERS

10"x18" Norton Plain, a.c. m.d.
10"x24" Landis Plain Self-contained, a.c. m.d.
10"x48" Landis Type C Plain Hydraulic, late
No. 13 Brown & Sharpe Universal & Tool, late
No. 49-53" Besley Vert. Spindle Disc
No. 81 Heald Internal, chucking, Size-matic, Gage-matic

PLANERS

30"x30"x8' Cincinnati, a.c. m.d.
36"x36"x10' Cincinnati, a.c. m.d., box table
42"x42"x14' Niles-Bement-Pond Heavy Patt., d.c. m.d.
42"x42"x16' Gray, orr. m.d.

MISCELLANEOUS

No. 1-A Warner & Swasey Univ. Turret Lathe, a.c. m.d., Timken, covered ways
Model A-3-6 Sturdybender Press Brake, a.c. m.d., 8'x12 ga.
42" King Vert. Boring Mill, a.c. m.d., p.r.t.
Model R-41-P Wiedemann Turret Punch
7"x7" Peerless "Mechani-Cut" Saw, a.c. m.d.

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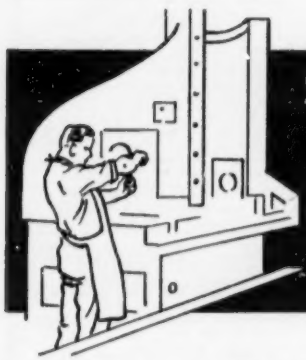

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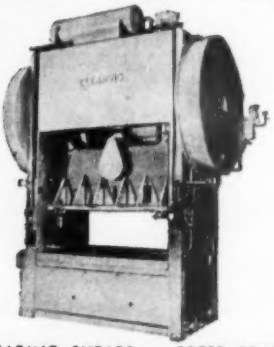

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No. 3 W.F.F. 4 Post High Speed Blanking Press. 2" Stroke. 200 RPM, M.D. Double Roll Feed. Scrap Cutter.

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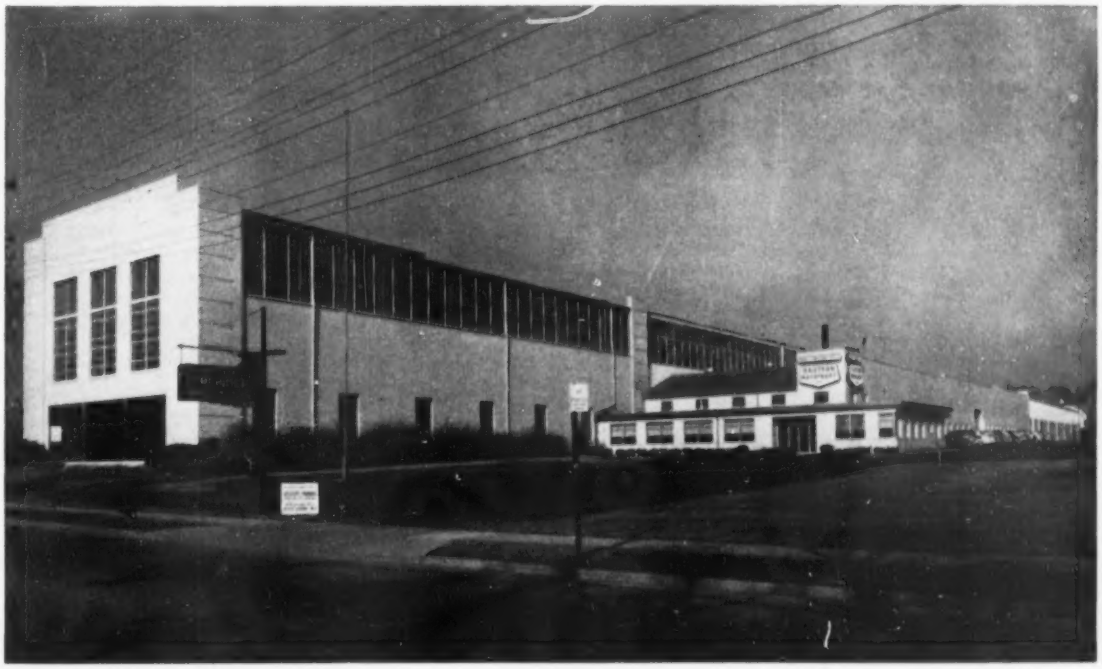

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4'-11" col. Dreses, gear box, m.d.
7'-16" col. American Triple Purpose, m.d.
8'-17" col. Dreses, gear box, m.d.
8'-19" col. Cincinnati-Bickford Super-Service, m.d.
Zewo Precision Universal Bench Type Radials, m.d., new

BALL BEARING DRILLS

No. 15 Buffalo, floor model, m.d.
No. 18" Buffalo, floor model, m.d.
No. 18 Canedy-Otto, bench model, m.d.
Providence Engineering Co., Model E, s.p.d.
No. ½, 1, 2 Avey, belted m.d.
No. 1B Edlund, m.d., new
No. 4 Fosdick, 8" overhang, belted m.d., No. 2 Taper
1 spindle Allen, belted m.d.
2 spindle Allen, belted m.d., 8" overhang
No. 3 Allen, belted m.d.
2 spindle Avey, size No. 1, type B, style VHP, m.d., 8" overhang
2 spindle Avey, No. 2, 3, belted m.d., p.f.
2 spindle #2 Leland & Gifford High Speed, 8" overhang, m.d.
#1LMS—3 spindle Leland & Gifford High Speed, late, m.d.
4 spindle Avey #1 High Speed, m.d., 7½" overhang, No. 2 M.T.
4 spindle No. 3 Avey, belted m.d., No. 3 Taper, 12" overhang
6 spindle Leland & Gifford, No. 2 Taper, m.d. on each spindle
6 spindle Henry & Wright, m.d., 15" overhang, No. 2 Taper

HORIZONTAL DRILLS

3 WAY Natco Horizontal Drill, consisting of 3 E13 Hole Units
No. ½Bx30" Pratt & Whitney 2 spindle Deep Hole Reaming Machine, m.d.
No. ½Bx50" Pratt & Whitney Gun Barrel Rifling Machine, m.d., latest
No. 1Bx74" Pratt & Whitney 2 spindle Deep Hole Reaming Machine, m.d., latest
No. 1½x105" Pratt & Whitney 2 spindle Deep Hole Drill, m.d., latest
No. 1½x105" Pratt & Whitney 2s pindle Gun Barrel Rifling Machine, m.d.
No. 1 Pratt & Whitney 2 spindle Deep Hole Drill, belted m.d.
No. 1½ Pratt & Whitney 2 spindle, m.d., old type
Special Horizontal Drill Mach. Cinti. Bickford Head mounted horiz. on base

MULTIPLE SPINDLE DRILLS

C13 Natco, m.d., 16x24" rect. head
No. 3 Baush, m.d., 16x30" head, 6 spindles
No. 3 Baush, m.d., 20x40" head, 6 spindles
No. 16 Foote-Burt Fixed Center, m.d.
3 spindle Rockford Gang Drill, m.d.
3 spindle 24" Barnes All Geared Self-Oiling, m.d.
3 spindle 28" Cincinnati-Bickford Upright, m.d., No. 4 Morse Taper
4 spindle Niles-Bement-Pond, m.d., 12' rail, No. 5 Taper

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21" Cincinnati, belted m.d.
24" Aurora, belted m.d.
24" to 30" Cincinnati-Bickford, m.d., upright sliding head
26" Aurora, m.d., taper
32" Aurora, belt drive
32" Superior Drill
No. 2 Colburn Mfg. Type, belted m.d.
No. 315 Baker, Heavy Duty, s.p.d.
No. 513 Baker, m.d.
#4—48" Defiance Machine Co. Drill, m.d.

GEAR SHAPERS

No. 12 Fellows Gear Shaving Machine, m.d., late
No. 6 Fellows, belt drive
No. 7, 7A Fellows, m.d.
No. 18 Fellows Gear Finishing Machine, m.d.
No. 6I Fellows, belted, m.d.
No. 6I Fellows, gear box, m.d.
No. 61A Fellows, m.d., latest type
No. 64B Fellows, m.d.
No. 615A Fellows, m.d., late type
No. 64A Fellows, m.d., latest
No. 643 Fellows, belt
No. 72 Fellows, m.d., latest
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6x20" Fitchburg Hydraulic Spline & Gear Grinder, m.d.
9" Pratt & Whitney Hydraulic Spur, m.d.
10" Pratt & Whitney Hydraulic Spur & Helical
No. 13LS Fellows Gear Lapper, m.d.
SG11 Gear Grinding Machine, m.d., latest

GEAR HOBBING MACHINES

No. 12 Barber-Colman, single overarm, m.d.
No. 34 Brown & Sharpe, m.d.
No. 44 Brown & Sharpe, m.d., Spur & Spiral
Pfauter Gear Hobber, Model RB 1, m.d., new

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No. 50 Cross Gear Chamfering Machine, m.d.
Gleason Spiral Bevel Gear Rougher, m.d.
3" Gleason Straight Bevel, m.d.
8" Gleason Straight Bevel, m.d.
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IN ADDITION TO THE ABOVE, WE ALSO HAVE IN STOCK AUTOMATICS, BOLT THREADERS, HORIZONTAL AND VERTICAL BORING MILLS, GRINDERS, HONING MACHINES, ENGINE LATHES, MFG. LATHES, MILLING MACHINES, RAILROAD MACHINERY, SAWS, SHAPERS, PLANERS, PRESSES, TURRET LATHES, ETC.

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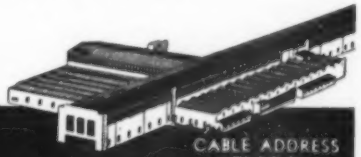

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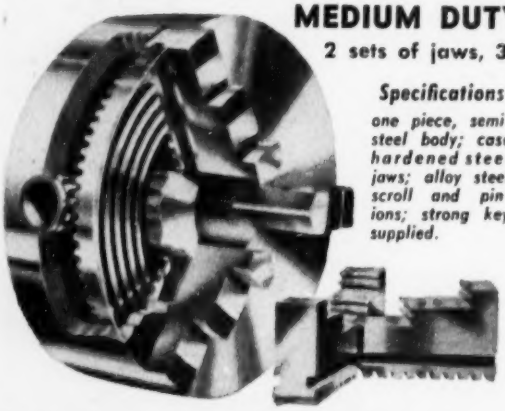
These lathe chucks, manufactured in England are equivalent in all respects to chucks selling here for two and three times the price. All are absolutely guaranteed with respect to accuracy, workmanship, and strength.



MEDIUM DUTY 3 JAW UNIVERSAL CHUCKS

2 sets of jaws, 3 pinions, for use with intermediate backplate.

Specifications *one piece, semi-steel body; case hardened steel jaws; alloy steel scroll and pinions; strong key supplied.*

Size	Weight	Price	Price Soft Jaws
2¾"	2½ lbs.	$ 25.00	$ 5.00
3¼"	3½	26.50	6.50
4"	6½	30.00	7.50
5"	12	37.50	9.00
6"	17½	45.00	10.00
7½"	29	57.50	13.50
9"	42	67.50	15.00
10½"	62	95.00	20.00
12"	88	125.00	22.50
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18"	200	250.00	35.00
24"	324	325.00	45.00

Steel body chucks are also available in some sizes. Soft jaws and spare parts are immediately available from New York stock.

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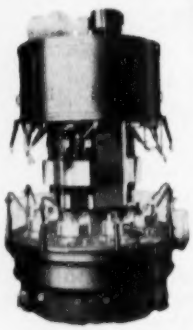


BULLARD MULT-AU-MATIC

16" 8-Spindle, Type D, Single Indexing. Complete with electrics.

SPECIFICATIONS

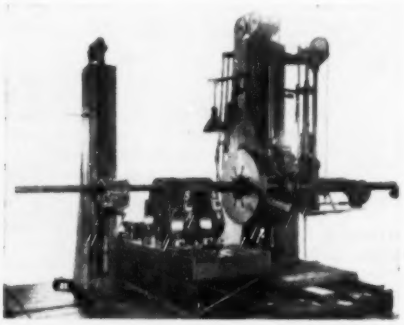
Standard power-operated chucks. Arranged for coolant with piping & splash guards.

NILES 6½"
FLOOR TYPE BORING MILL

with Floor Plate, Outboard Support & Electrics
Motor: 25 HP. 250V DC 400-1200 rpm
"V" Belt Drive

SPECIFICATIONS

6½ Diameter bar with 50" travel
13' High column
12' Travel
14'x14' Floor Plate with "T" slots



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LATE TYPE MACHINERY

AUTOMATIC: Cone 3½" 4-Spindle. Serial No. 2696-AB (1940).

GRINDER: Excello No. 35 Thread Grinder. Serial No. 1180.

LATHES: Denver 6-R Universal turret Lathe. Serial No. A-52690-2.

Fay Automatic Lathe. 12"x21". Serial No. 80830. (1939.)

THREADING MACHINE: Landmaco Double Head. 1" Capacity. Serial No. 1-L15.

FOSTER MACHINERY SALES CO.
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40"x144" cc Pittsburgh Engine Lathe, L/C
20"x96" cc LeBlond Eng. Lathe, Lima Drive
20"x48" cc LeBlond Eng. Lathe, Lima Drive
#601-WD Oster Hand Screw Machine, MTB
#21 B&S Production Mill, MD
#13-B B&S Production Mill, MD
#2 Kent Owens Hand Mill, MD
#57 Niagara SS Single Crank Press, 71 ton, 3" stroke, 7½ HP Motor
#33 Toledo Styles Type Press, 33 ton, 1½" stroke, 2 HP Motor
#3 Besley Double End Grinder, 10 HP Motor, Blower with 2 HP Motor
10x24 Norton Plain Cylindrical Grinder, MD
3" Rockford Horizontal Boring Mills, Side Head

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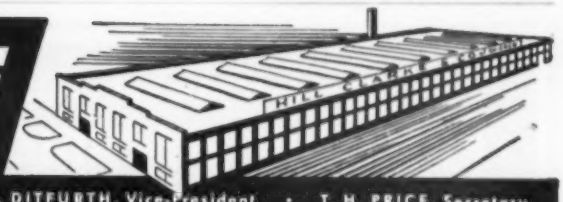

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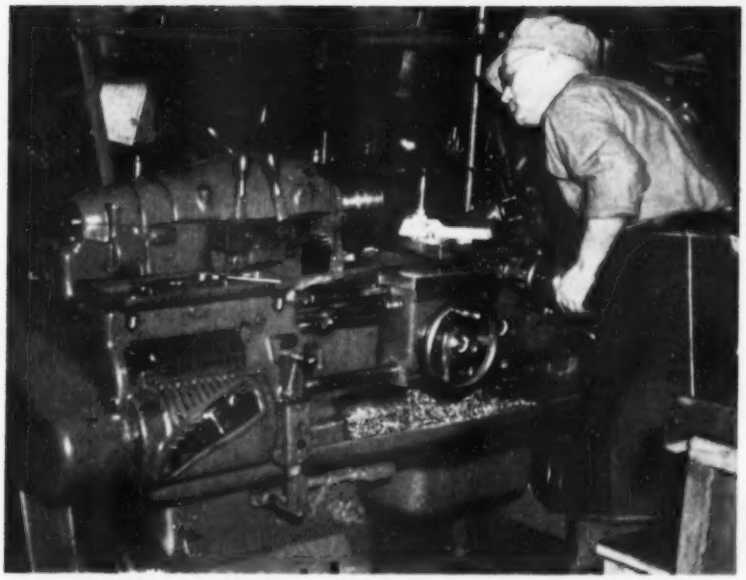

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AUTOMATICS

1-1/16" Model A Cleveland (1942)

DRILLS

1 Spdl—15" Sw—No. 2 Avey, Cam Fd.
2 Spdl—24/ Sw—No. 3 Avey
D-31 Fox Multiple Drill No. 2 Taper

GEAR MACHINES

No. 12HS Gould & Eberhardt Hobber
11" Gleason Bevel Gear Generator
No. 64 Fellows Gear Shaper
No. 36-BM G & E 3 Spdl, Rougher
No. 612-A Fellows Gear Shaper
No. 615-A Fellows Gear Shaper
No. 65 Fellows—Cone Dr.
8" cap Red Ring Gear Lapper

LATHES

16"x33" R-14 Seneca Falls Auto. Lathe
19"x8' LeBlond Hvy. Duty Lathe
36"x18' Putnam Grd. Hd. M.D.
13¾"x39" Centers Dimco Lathe (New)
15"x39" Centers Dimco Lathe (New)
18"x59" Centers Dimco Lathe (New)
23"x60" Centers Dimco Lathe (New)
24"x39" Centers Dimco Lathe (New)
5W Acme Ram type Tur., 2" Capacity
No. 6 Warner & Swasey Tur.-Bar Fd.
18" Libby Tur. Lathe, M.D.
No. 3AL Gisholt
No. 3AL Gisholt Cross-Slide Tur.
No. 4A Warner & Swasey—7½" Hole —Spdl.

GRINDERS

6" x 18" Landis (1942)
6" x 18" Norton Cylindrical (1943)
Hill-Clarke Type Motor Driven Grinders
10"x36" centers
10"x72" centers
10"x96" centers
24x32 Gap x144" centers
14"x36" centers
14"x72" centers
20"x96" centers
No. A-3—12" Arter Rotary Surf.
No. 22—12" Heald Rot. Gdr. (1944)
No. 1109 Bryant Internal Grd. (1951)
(9" swing—1" bore x 3½" grind stroke)
5B Bryant Internal Grd.
No. 16-16 Bryant Internal Grd.
No. 16-28 Bryant Internal Grd.
No. 24-26 Bryant Internal Grd.
No. 81 Heald Centerless Internal
No. 74 Heald Internal Centerless

MILLING MACHINES

54"x30"x16' Ingersoll Slab Mill
6"x168" Pratt & Whitney Thrd. Mill
10"x48" Hanson-Whitney (1942)
12"x102" Lees-Bradner Thrd. Mill

PLANERS

36"x36"x12' Cincinnati, 2 hds.
36"x36"x12' Gray, 2 hds.
48"x36"x14' Gray, 2 hds.
48"x48"x12' Cincinnati, 2 hds.
60"x48"x27' American, 4 hds.

MISCELLANEOUS

1"-2" Dia. Cap. Micro. Hor. Hone—#200
¼"-1" Dia. Cap. Micro. Hor. Hone—#H-2
42"—18 gage Economy Power Shear
75 Ton R & K Straight Side Press
3 Ton Fox Hydraulic Press
2—12"x96" Magnetic Chucks
20'x1" cap Southwark Roll
15" Dill Slotter
18" Dill Slotter
38" Morton Draw-Cut Shaper (1945)
No. 0 Bakewell Tapper

Attention!

Model 200 H-5 Double End Micromatic Hone. See this machine in our plant, tested under power. Know what dependable work it can turn out.

FULL MONEY-BACK GUARANTEE

1. Hill-Clarke always give you an unconditional money-back guarantee.
2. All machines in stock.
3. You can see your machine run and tested under power in our plant before purchasing.
4. Complete and modern facilities plus experienced craftsmen for RE-MANUFACTURING machine tools in our 58,000 sq. ft. plant.
5. A responsible organization—with 86 years' experience.

Write, Wire or Phone **HILL-CLARKE MACHINERY COMPANY**
651 WASHINGTON BOULEVARD, CHICAGO 6, ILL. PHONE CEntral 6-0500

an exceptional stock of PRECISION MACHINE TOOLS

BORING MILLS

24" Bullard Spiral Drive Vertical Turret Lathe—1942

42" Bullard New Era Vertical Turret Lathe

100" Betts Heavy Duty Vertical Boring & Turning Mill

GRINDERS

6"x18" Landis Type C Plain Cylindrical—Plunge Cut—Automatic Cycling

6"x30" Norton Semi-Automatic Plain Cylindrical—Hydraulic Rapid Infeed—reciprocating spindle

10"x36" Landis Type C Hydraulic Cylindrical—1941

14"x36" Norton Type C Cylindrical—Hydraulic Plunge—1943

#81 Heald Plain Chuck Type Internal—1941

#73 Heald Airplane Cylinder & Sleeve—1942

12"x36" Norton Type "L" Universal—1941

10"x24" Landis Type C Hydraulic Universal—1939

#186—30" Gardner Horizontal Disc—1941

#24—53" Gardner Horizontal Disc—1939

#95—110" Bridgeport Face Grinder—1943

LATHES

12"x30" Model C Monarch Geared Head Toolroom—1940

14"x30" Reed Prentice Sliding Gear Head Engine—1939

16"x48" Bradford Geared Head Quick Change—1940

16"x78" Monarch Model W Engine

MILLERS

#10 Brown & Sharpe Plain—1941

18" Cincinnati Plain Manufacturing Type—1941

#2H—24" Milwaukee Manufacturing Type—1940

#1218 Milwaukee Simplex—1941

#1854 Milwaukee Duplex—1942

FV5MZ Skoda Vertical—Table 31"x91 3/8"—1942

4½"x12" Model C Pratt & Whitney Thread Miller

6"x36" Model LT Lees Bradner Thread Miller—1940

PRESSES

#59 Niagara Single Crank, single Geared, Straight Side, Tie Rod, Bed 31"x27", Stroke 3"

200 tons HPM Fastraverse Double Action—Stroke 18"—bed 48"x48"—1944

TURRET LATHES

#3 Gisholt Universal—1942

#4 Gisholt Universal—Bar feed—Preselector head—1940

#1L Gisholt Universal—saddle type—1942

#2L Gisholt Universal Saddle Type—1941

#1 Warner & Swasey Electric Head—1944

#1A Warner & Swasey Saddle Type—Bar Feed—1939

#2A Warner & Swasey Saddle Type—Bar Feed—1941

J. L. LUCAS & SON, INC.

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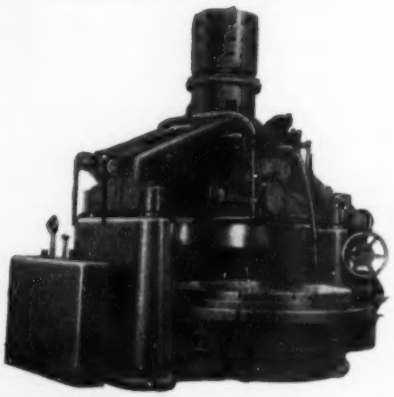
EMERMAN *offers from* STOCK

LATE TYPE UNUSUAL ROTARY SURFACE GRINDER OFFERED IN EXCELLENT OPERATING CONDITION

84" LUMSDEN ROTARY SURFACE GRINDER SERIAL No. 13026

Table diameter 84"
Wheel diameter 44"
Grinding capacity diameter 88"
Max. height under wheel 15"
Table speeds 4 to 1 RPM
Feeds coarse range .02"-.002"
Feeds fine range .005-.0005"
Spindle 425 RPM
Spindle motor 80 HP
Table Motor 7½ H.P.
Feed Motor 7½ H.P.
Pump Motor ½ H.P.
Floor space 17'1"x 11'8"
Approx. weight 24 tons



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875 W. 120th STREET — CHICAGO 43, ILLINOIS

NEW AND USED

1—Potter & Johnston auto. Turret Lathe Model 6-DREL

1—Herbert Universal Turret Lathe #4

1—Double Spindle Vertical Profiler

3—Cincinnati Vert. Mills #0-8

3—Girards Radial Drills 3 ft., 4 ft. & 5 ft.

2—Double end Centering Machines 10x42

1—Jones & Lamson auto. Thread Grinder 7G-6x36

1—Landis Hydr. Internal Grinder 15x8

1—Logan hydr. Press, cap. 5 ton

2—Hi-speed V-Ram Shaper 20"

MACHINE & TOOL CO.

Long Island City 1, N. Y.

ST 4-2726

MACHINERY FOR SALE

1—Production Air Tracer Lathe, 13" x 42" Monarch Monamatic with 15 hp motor, 1800 rpm, serial #MM31848-AT, purchased in February, 1948. New machinery guarantee. Fully equipped.

1—24" Bullard Vertical Turret Lathe, serial #16496, purchased in 1940, 15 horsepower motor, 220 volt, 3 phase, 60 cycle, with Coolant Tank.

2—Gleason Bevel Gear Generators, serial #9449 and #13630, in excellent condition.

FS-6799, AMERICAN MACHINIST

330 W. 42nd St., New York 36, N. Y.

#4A W6S Saddle Type Universal Heavy Duty Turret Lathe

#9A Jones & Lamson Saddle Type Universal Heavy Duty Turret Lathe

WIGGLESWORTH INDUSTRIAL CORP.

199 Bent St., Cambridge, Mass.

PRESSES

WORLD'S LARGEST STOCK

new and rebuilt — also BRAKES, SHEARS

APRIL FEATURE

180 ton Bliss Toggle Press.

MANY OTHERS—Send for Brochure!

HYMAN

225 Lafayette St., N. Y. 12

1941-1953 MACHINE TOOLS

IMMEDIATE DELIVERY — NO PRIORITIES NEEDED

CAM MILLERS

VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

CENTERING MACHINES

SUNDSTRAND: 44" Double End Centering Machine

CUTTER & TOOL GRINDERS

FELLOWS: Flat Top Helical Gear Cutter Grinder
OLIVER: 10" Template Tool Bit
RANSOM: 2-Wheel Grinder 3 HP
RUSSELL: 40" Saw Sharpener (New) automatic indexing

DRILLING MACHINES

ALLEN: #2 High Speed, 15" overhang
PRATT & WHITNEY: ½B x 50 Deep Hole Drilling & Reaming Machine, 2-spindle
SUNDSTRAND: 44" Double End Centering Machine

GEAR CUTTING MACHINES

BROWN & SHARPE: No. 6 Gear Cutter, 72" diameter, 1¾ D. P. capacity
CLEVELAND: Model 130 Gear Hobber (like new)
CLEVELAND: Model 140 Gear Hobber (like new)
FELLOWS: 61A Shaper, 18" dia.
FELLOWS: 64A Shaper, 18" dia.
FELLOWS: 72 Shaper, 7" dia.
FELLOWS: Flat Top Helical Gear Cutter Grinder
FELLOWS: Straight Line Generator, 3" dia. with many cutters
GLEASON: #12 Rough & Finish Gen.
GLEASON: 3" Straight Bevel Gear
SYKES: Gear Shaper 14" external, 20" internal (New)
SYKES: Rack Cutting Machine 12" to 36" length capacity (New)

GEAR AND SPLINE GRINDERS

PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
GEAR GRIND MACH: GG-19, 10"x 24" Hydr. Spur Gears and Splines

GEAR FINISHERS & TESTERS

FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical
FELLOWS: #12C Cone & Spacing Inspection Instrument
GLEASON: No. 4 and No. 6 Bevel Gear Testers. Hand and Power
NATIONAL BROACH: SIC-12" Red Ring Gear Testing Machine

GRINDERS—CYLINDRICAL

BROWN & SHARPE: No. 10 capacity 6"x18" plain
CINCINNATI, 6"x18" Hydraulic, Plain
LANDIS: 16x32" Type "D" Crankpin, hydraulic, for grinding crankshafts
NORTON: 10"x18" 45° angle wheel

3-WAY GUARANTEE

1. Should any machinery purchased from us prove unsatisfactory, you can return the machines within 30 days, via freight prepaid to our plant, and a full refund will be made.
2. Machines at our plant can be demonstrated and tested under power before purchasing.
3. You are dealing with a well-established, highly-rated firm of machinery engineers with over 33 years of proven responsibility.

GRINDERS—GEAR & SPLINE

GEAR GRIND MACH.: GG-19, 10"x 24" Hydr. Spur Gears and Splines
PRATT & WHITNEY: 10" single and double wheel, hydraulic feed

GRINDERS—INTERNAL

BRYANT: No. 5Y Internal
HEALD: 72A3 Sizematic Centerless

GRINDERS—RADIUS

VAN NORMAN: #73, capacity 7½"
VAN NORMAN: #639, capacity 7"
VAN NORMAN: #649, capacity 6" to 16" diameter
VAN NORMAN: #3½ Un. Radius

GRINDERS—THREAD

EXCELLO: #31 External, dia. 5"x18"
JONES & LAMSON: #636 Universal, 6" dia. x 36" centers and one extra multiform wheel dressing attachment

HONING MACHINES

MICROMATIC: H-510 Double End Horizontal, ¾" to 2" dia.
MICROMATIC: H-2 Single End Horizontal, 2-spindle, ¼" to 1" dia.

JIG BORING MACHINES

LINDNER #14 & #15 Jig Borers, new

LAPPING MACHINES

FELLOWS: 8LSI and 13 LSI Gear Lappers, external and internal spur and helical

LATHES PRODUCTION

BLOUNT: Polishing speed lathe 12" dia. x 48" centers
H.E.B.: High production hydraulic duplicating and copying lathes (new)
LODGE & SHIPLEY: #3A Duomatic. 25½" swing x 27" centers
POTTER & JOHNSTON: #6 DREL Automatic
PROGRESS: Geared head 16" to 30" swing (New)
New Engine Lathe 49" swing x 20' centers
New Engine Lathe 27" swing x 23' centers

LATHES—TURRET

WARNER & SWASEY 1A Turret Lathe
WARNER & SWASEY #3 Turret Lathe
HERBERT: #2, #4, #7, and #8 Sizes (new)
WEBSTER & BENNETT: Vertical Turret Lathes 36" & 48" (New)

MILLING MACHINES

TAYLOR-FENN: M-80 Duplex Spline
RICE-BARTON: Duplex Spline
VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

SAWS & CUT-OFF MACHINES

CAMPBELL: No. 425 Cutalator Abrasive Cut-Off, 4½" dia. capacity
MOTCH & MERRYWEATHER: No. 3 Circular Saw with auto. stock feed
RUSSELL: 9½" cut-off Saw with Auto. Stock Feed (New) Hydraulic
RUSSELL: 5½" dia. cut-off saws, auto stock feed, hydraulic (New)

THREAD MILLERS & TAPPERS

HALL PLANETARY: Model "D" Thread Miller
LANDIS: 2½" single head horiz. threading machine
LEES-BRADNER: 40A Thread Miller
MURCHEY: #22 Horizontal threading and tapping machine, ½" to 2½" dia. capacity, single spindle
NATCO: Vertical Tapper 16 spindle

WIRE FORMING MACHINES

BAIRD: 4-slide wire former
HEENAN & FROUDE: Wire forming, 4-slide machines (new)

MISCELLANEOUS

CUTOFF: Campbell, abrasive 425 Cutalator 4½" dia. Capacity
RACK CUTTING MACHINE: Sykes 12" to 36" length capacity (New)
CUT-OFF: Russell 5½ & 9½" cut-off saws with auto. stock feed (new) hydraulic
TEST STAND: Denison 918-AM Hyd.
LATHES: Blount Polishing Speed Lathe, 12" dia. x 48" centers
GOGAN BRINELL Hardness Tester Model 16-J
SHAPERS: Klopp 16 to 26½" (New)
SHAPERS: Hercules 16" & 22" (New)
SUNDSTRAND: 44" Double End Centering Machine
WIRE FORMING MACHINES: 4-slides (new)

INSPECTION INVITED — Telephone HAnover 2-4520

TRIPLEX MACHINE TOOL CORP.

75A West Street, New York 6, New York **Cable Address TRIMACTOOL**

MACHINE TOOL ENGINEERS SINCE 1919

L A K E
IS GEARED TO INDUSTRY'S MACHINE TOOL N-E-E-D-S

AUTOMATIC SCREW MACHINES
#2 BROWN & SHARPE Automatic, Ser. #4000 to 8000 (8)
#0 BROWN & SHARPE Automatic, Ser. #4000 to 8000 (6)
#0G BROWN & SHARPE Automatic, Ser. #8000 to 11,000 (4)
#00 BROWN & SHARPE Automatic, Ser. # up to 11,000 (7)
#2G BROWN & SHARPE Automatic, Ser. #6963
1-1/16-1⅜ CLEVELAND Model A Automatic Screw Machine (3)

DRILLS
#2 AVEY—3 spindle type MA6
3'-7" CINCINNATI Royal Radial Drills New (2)
16" CINCINNATI Royal Floor Drills, New (5) —16" & 18"
16" CINCINNATI Royal Bench Drills, New (5)
6'x13½" CINCINNATI BICKFORD Radial U.S. Vari-Drive.
25" SIBLEY Stub column 3" capacity

GRINDERS
#13 BROWN & SHARPE T & C Grinder (2)
#1½ GRAND RAPIDS T & C Grinder (1)

LATHES
CINCINNATI Model LT for quick delivery NEW (Chicago Territory)
CINCINNATI 24"x120"x14' bed (2)
CINCINNATI 24"x72"x10' bed (1)
CINCINNATI 18"x96"x12' bed (1)
RYERSON-CONRADSON 25"x108"x14' bed (1929)

MILLS
#1 MILWAUKEE with TREE Vertical head
#1½ BROWN & SHARPE Universal with Tree Vertical head

PUNCH PRESSES
#5 BLISS Solid Back (2)
#3½ BLISS Solid Back Stiles type (1)
#4 WALSH OBI BG
#21 BLISS OBI, (3)
#19 BLISS OBI, (4)
#6832 VERSON 150T 3½ double action
#95½ TOLEDO 250T
#5 VERSON OB Steel Frame
660 TOLEDO 100T (4)
25 & 50 Ton HENRY & WRIGHT dicing machines
620 & 630 BLISS high speed punch presses. Late

TURRET LATHES
2G MOREY Turret Lathes (3)
3L GISHOLT Cross sliding turret
#4 W&S, GH, MD
#2 BROWN & SHARPE Wire Feed (3)
#1 BROWN & SHARPE Wire Feed
#0 BROWN & SHARPE Wire Feed (2)

MISCELLANEOUS
6" JONES Vertical Slotter M.D.—1940
2 to 5 HP Buffers (11)
#0 LAPOINTE Horizontal Broach
XA3 OILGEAR Hydraulic Broach
#V-18 AMERICAN Vertical Broach
NATIONAL Semi Automatic Nut Forming Machine
NIAGARA #180 Combination Machine
BLISS #112 Rotary Trimmer
202½ V & O Trimming Machine

$40,000.00 Stock of replacement parts for Brown & Sharpe Automatic Screw Machines.

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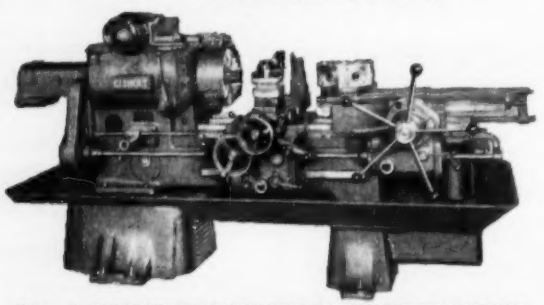
★ SERVING THE INDUSTRY SINCE 1920.

MACHINE TOOLS

TELEPHONE TAylor 9-8200
LAKE MACHINERY COMPANY
942 WEST LAKE STREET • CHICAGO 7, ILLINOIS

4½" CAPACITY



No. 3 GISHOLT UNIVERSAL TURRET LATHE

Preselector Head
Bar Feed and Chuck
Threading Attachment
Very well tooled

ALEXANDER & FIDEN MACHINERY CO., INC.
1014 GENESEE ST. BUFFALO 11, N. Y.

MODERN MACHINES
Cincinnati #3 HI-POWER Vertical Miller Serial #E649H—Rebuilt and guaranteed.
Heald #25A Rotary Surface Grinder—Serial #4577 Reconditioned and guaranteed
3'9" Column Cincinnati Bickford Radial Drill Serial #2A-41—new 1938—Rebuilt & guaranteed
72" King Heavy Duty Vertical Boring and Turning Mill—Serial Lot 38-#175 Rebuilt & guaranteed
4½" Bar Giddings & Lewis #45 Table Type Horizontal Boring, Drill and Milling Machine—Serial #8150. Reconditioned & guaranteed
Ingersoll Adjustable Rail Planer Type Milling Machine—Serial #3158—Reconditioned and guaranteed
#64 Fellows Gear Shaper Ser. #26113
#61A Fellows Gear Shaper—Ser. #25634
Rebuilt 6' 15" Column American Triple Purpose Radial Drill—Serial #55502. Rebuilt & guaranteed
60" Hanchett Face Grinder—Reconditioned and guaranteed
6D Potter & Johnston Automatic Chucking Machine Serial #70393
16" Gould & Eberhardt Shaper—Ser. #66737

HAZARD BROWNELL MACHINE TOOLS, INC.
350 Waterman St., Providence, R. I.

IMMEDIATELY AVAILABLE
ROLL FORMING MACHINES
Kane & Roach 15 stand, 30" wide, 4½" dia. shaft 75 H.P. M.D.
Yoder 14" stand, 24" wide, 2½" dia. shaft, 25 H.P. M.D.
Tishkin M-2 Ton stand Yoder with AC-2 Cutoff.
Rafter Tube Forming Machines, 5 & 7 Stand.
Yoder 5 stand vertical, with AC-1 Cutoff.

PARTIAL STOCK LISTING

"The most diversified stock of machinery in the country. If it's machinery we have it."

National Machinery Exchange
128 Mott St. New York 13, N. Y.

Late Type Below Market

CHUCKERS
6" Warner & Swasey Automatic Chucker, 1948
8½" GOSS & DE LEEUW BARGAIN, 1941
11" x 10" GOSS & DE LEEUW BARGAIN, 1932

GEAR EQUIPMENT
TYPE A BARBER COLMAN HOBBER, 1940
75 FELLOWS HELICAL GEAR SHAPER, 1942
10" NATIONAL BROACH GEAR SPEEDER, 1944
36" Single Wing Tangent Bender, 1946

GIBBS MACHINERY CO.
780 Harcourt Detroit 30, Mich.
VA 2-9435 VA 2-8366

IF THERE IS

Anything you want

that other readers of this publication can supply

OR—

Something you don't want

that other readers can use advertise it in the

SEARCHLIGHT SECTION OF

AMERICAN Machinist

SOME LATE MACHINES STILL AVAILABLE

BORING MILLS

Bullard 24" V.T.L., Spiral Drive
Cleveland 2½" Bar Capacity
Giddings & Lewis #32, 3" #25, 2½" Cap.
Kings 42", 72" Vertical 2 rail heads
Niles-Bement-Pond 4", 4½" Bar, 60" Vert.
Niles-Bement-Pond 60" Vertical
New 3" Horizontal Boring Mill

DRILLS AND RADIALS

Brand New Radials
American 6'x15" Universal
Baker No. 321 Vertical Boring & Drill
Bausch Multi-spindle
Buffalo #2 Motor Spindle, #16—4 Sp.
Buffalo: Power No. 41, No. 42
Canedy-Otto 21" Sliding head New
Cincinnati Bickford 6'x15" col.
Edlund 8" Model 2B, Sliding Head
Natco #12 20 spindle drill
24" Sibley Sliding head
New Geared Box Col. Drills 24'
Foote-Burt #25 3" capacity
Leland Gifford 2 LMS, 3 MS

NEW VERTICAL MILL

ENGRAVERS

Gorton #1A, ME, 1D, 3Z, Deckel G1L, G1, GK2
Taylor-Hobson 3 dimensional Pantograph

GEAR EQUIPMENT

Barber-Colman Mod. SHS. Sharpener
Barber-Colman #2, #12 (3)
Barber Colman Hobber Type 5
Browne & Sharpe #3 Gear Mill, 26" Cap.
Fellows High Speed Shapers 712, 725, 71, 7
Fellows #20M Redliner, Flather 72" Cutter
Gleason #2 Surface Hardener, No. 3 Gear Tester
Gleason #3 Spiral, #3 Straight Bevel
Gould & Eberhardt 36" Cutter
Michigan Gear Finisher 24" cap., 862-24A
National Broach Red Ring Lapper, Finisher
Schuchardt & Shutte #1 Hobber

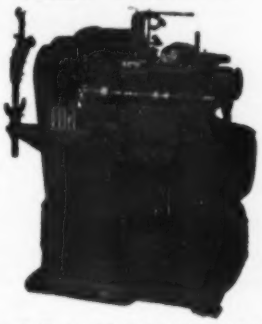
GRINDERS, MISCELLANEOUS

Browne & Sharpe #2 Universal 14"x28"
Brown & Sharpe #5, 3"x18" Cylindrical
Browne & Sharpe #3 Universal w/Internal Sps.
Browne & Sharpe #13 Universal Tool & Cutter
Bryant #5 Internal, chucking
Cincinnati 6x18" Hyd. #4—Centerless
Gardner Disc Grinder 30"—15 H.P. Motor
Grenby Models 1G1 & 1G2—Internal
Gorton Ped. Type Tool Grinder Mod. 375-2
Heald #73 Internal Centerless, Sizematic
Heald #81 Internal Gagematic
Heald 72A3 Int. Centerless Sizematic
Landis 6"x30" Type C Cyl., 10x24 Univ. 12x30
Norton Type C 6"x18" Semi-Automatic cyl.
Norton 10"x18" Type C cylindrical
Norton 14"x96" cyl., 16x48 Univ.
Norton Roll Grinder 50"x28'
Oliver #510 Drill Pointer
Pratt & Whitney Radius Model R6
Rivett Internal with External Sps. Model 104
Sellers 6-G Drill Grinder
Sellers 69 Tool K.O. Lee tool
Van Norman #666 Crankshaft
Wicaco Internal

NEW IN STOCK

Air Hydraulic Presses — Arbor Presses #6C Famco — Band Saws Johnson Kalamazoo — Famco 6x12" — Drill Presses all sizes—Hydraulic Press Northern 20 Ton—Injection Molders, 1 ounce—Power Presses, OBI, 1, 4, 4½, 5, 7½, 10, 15, 20, 30 55, 85 ton—Shapers, 7", 8", 14", 18" Shaperite—Shears, Foot 22" to 8', 16 & 18 ga.—Shears Power 3'x18 gauge to 10' x 10 ga.—Welders, Arc, Seam, Spot, all sizes Motors Grinders Buffers.

AUTOMATIC SCREW MACHINES



Brown & Sharpe (2) Model 2G, serial No's. 8500 series, 1¼", capacity.
Brown & Sharpe (9) Model 0G, serial No's. 9600 & 10700 series, ⅝" capacity.
Brown & Sharpe (6) Model 00G, serial No's. 14, 15, 16 & 17000 series ⅜" capacity.
Ceco Screw Machine ⅜" capacity.
Cleveland, Model AA-11, Serial #36586.
Cleveland Model B. Serial #42618/843, 1-1/16" capacity.
Conomatic 4 Spindle, Serial 2309FF, 1½"
New Britain Gridley 61 6 Spindle, Serial No. 25410, 1⅛" capacity.

GRINDERS, SURFACE

New 8x24" Hyd. Feed, 10x18", 6x18"
Abrasive 8x24", #33 Vert. & #34
Blanchard #16, 26" Mag. Chuck
Browne & Sharpe #5, #2 with Chuck
Heald 22—12" chuck; Arter 12", Covel No. 15,
Norton 6x18" Hydraulic Vertical
Portman 12" Chuck Rotary
Pratt & Whitney 12x36" Vertical
Thompson Hyd. 8"x24" Hoz., Spindle
Taft Pierce #1 Precision

LATHES

American 14"x30", Bridgeford 36"x20', 32"x16'
Gisholt Simplimatic 18"x16½, 2 Tables
Hendey 12"x42" and 12x30", 1941
Hendey 14" Yoke Head Lathes
LeBlond Regal 10"x3' bed, 13x42", 17"x30" Late
LeBlond 25/50x96" Gap, Late type.
Lipe-Carbo 12"x18" (2)
Lodge & Shipley #3A, Duomatics
Pratt & Whitney 16"x60, 10"x20", 16"x36
Monarch Magna-matic 14"x54"
New 16, 18, 20", 28" Immediate Del.
New Tool Makers 10x24", South Bend 9"
Reid Small Piece #9WSL, Sheldon 12"
Rivett Model 918 Precision. Mod. 715
Putnam, Sliding Gap 22"/46"x92"
Sundstrand 8x15", 15' Stub
Wickes 32"x35' Geared Head

MILLS, PLAIN, UNIV. PROD.

Brand New Universal Mills No. 1, No. 2
Archdale Plain, 14" Production
Brown & Sharpe #3B Plain. No. 2, 3A, 21, #2L
Cinn. No. 3, 4 Plain Spd., 18" Manufacturing
Kent Owens 1V, 1-B, 1-14, 1M
Kempsmith #1 Pl., Vert. & Div. Hd.
Milwaukee 2H Univ., 2H Plain.
Milwaukee #2B, Plain & Univ.
Sundstrand #00, 0, Rigidmils
Sundstrand #3A Rigidmil with copying Attach, 33
Van Norman #2L Univ., Dividing Head

MILLS, VERTICAL

Brand New Vertical Mills
Cincinnati 2 Spindle Hydromatic
Cincinnati (2)—1-18 Plain Automatic
Cincinnati #3, #4 hi-power, 08 Vertical
Cleveland No. 1, table 8"x32"
Morey #12M Profiler, 2 sp. 2 Maximiller.
Reed Prentice Vert. Mill & Die Sinker Mod. 3VG

PRESSES

Bliss No. 1 Double Action Drawing Presses
Bliss 645, 650 Hi-Production Presses
Bliss 18, 19, 21, OBI, 58, 62, 162, OB
Bliss 4½ Double Action, Roll Feeds, Cam (2)
Bliss #78½, 330 Ton SS, Bliss 74½
Bliss 5-48 Dbl. 32x48" bed, Cushion
Hamilton 850 Ton S.S. Bed 27x48
Hamilton 110 FM Die Tryout Press
New 85, 60, 55, 30, 20, 15, 10, 5 Ton O.B.I.
Niagara Herning, 15 Ton—Toledo 32 Ton Honing
Niagara A1¾, O.B.I., Niagara No. 27
Stokes Tablet Press, type K, Late, Model F
Toledo 92½c Double Crank 43x23" bed
Toledo 29 Double Action Cam
V. & O. #102 O.B.I. Reducing
Walsh No. 3 O.B.I. 23 Ton, L1 #3
Z & H #41½, O.B.I. 20 Ton

TURRET LATHES

Acme 6W Fox 2-916" Cap. #2 Cross Slid. Turret
Bardons & Oliver #2, 3, 5, 7, Bar Feed
Brown & Sharpe, #2 Hand, #10, 11
Denver 6 2" Shell Turret (2)
Foster #2B 2½" Cap. Morey #2G Late
Gisholt 2L, Cross Slid. Tur.
Gisholt #5, Bar Feed, Plenty of Tools
Gisholt 4R—9¼" hole in spindle
Jones & Lamson No. 5 Bar Feed
Libby 1HS with threading att.—3R, 4R
Oster 601 WD. #2 Simmons Microspeed
Warner & Swasey #1, 1A, 2, 3, 4, 5

MISCELLANEOUS

Band Saw: New Kalamazoo & Johnson
Bolt & Pipe Threader: Landis, Oster-Williams
Boring Bar: Underwood 4"
Broach: New 6 Ton, Horizontal, 11 Ton Vertical
Hacksaw: Peerless 6"x6", Racine 6"x6"
Hand Mill: Whitney
Hoist: 5 ton capacity 7½ HP motor
Honer: Micromatic H-4, MC1H—Sunnen—Mod. MA
Jig Borers: New Swiss
Keyseater Davis, Baker
Oil Groover: WICACO
Pipe Bender, Kane & Roach, Vari-drive
Planer: Niles-Bement-Pond 36x36'x10'
Rotary Table: Cincinnati, power take-off
Saw: Shaping 6x6", 13x13"
Scrap Cutters & Granulator: Ball & Jewell
Shapers: 24" Rockford, 24", 28" Gould & Eberhardt. Cinn. 20, 24", Columbia 36"
Shears Power, 10 3/16", 10" x 16 gauge
Vertical Milling Att. New, Bridgefield
Tapper: Haskins—2C, 1A, Bakewell #2
Welder 50 KVA Eisler Air Operated, New Seam.
Welder: Taylor-Winfield 50 KVA Hi-Wave

New Lathes 16" to 28", Mills, Boring Mills, Broaches, Shears & Presses

HYDRAULIC EQUIPMENT

8 and 9 oz. Injection Moulders
125 Ton Southwark Press, Bed 96"x30". 30" stroke, 2 to 4 ft. opening
150 Ton Triple Action HPM Press
200 Ton W.F. Hobbing Press
250 Ton Watson & Stillman 28x24"
300 Ton Watson & Stillman 24x29"
300 Ton Watson Stillman 20"x20" Platen 8" St. 19" opening
600 Ton Williams & White 42"x60"
800 Ton Williams & White 42"x60"
800 Ton W&S Hobbing Press

All Hydraulic Equipment is completely engineered and checked by a competent staff thus assuring reliability.
Send us your Hydraulic problems.

This is but a partial listing. Write for free Cat alog. Inquiries invited. HUNDREDS OF OTHERS

AARON MACHINERY CO., Inc., 45 Crosby Street, New York 12, N. Y.

"CABLE—AARMACH N. Y." **Telephone WOrth 4-8233**

EXCEPTIONAL... BORING MILLS

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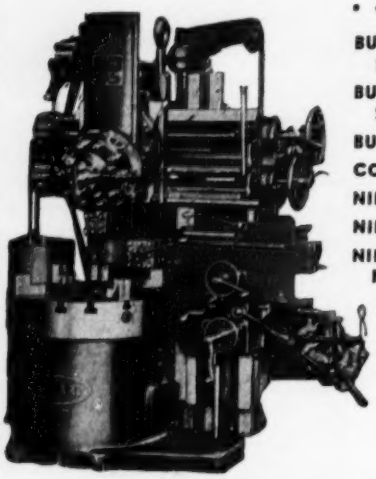

BULLARD 42" Vertical Boring Mill
Spiral Drive

BULLARD 24" Vertical Boring Mill—Spiral Drive

BULLARD 42" Vertical Boring Mill—Spiral Drive

BULLARD "A" 16" Mult-au-Matic

COLBURN 72" Vertical Boring Mill; P.R.T.

NILES-BEMENT-POND 53" heavy pattern

NILES-BEMENT-POND 100" hy. dty.; P.R.T

NILES - BEMENT - POND 120" heavy duty; P.R.T

BETTS (CONSOLIDATED) 120" P.R.T 2 Swivel Heads; M.D.

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AUTOMATIC: BROWN & SHARPE 00G, 1941

BALANCER: GISHOLT, Mod. No. 3S, Dynetric, 1947

BORING MILL: BULLARD 36", V.T.L., 1942

DRILL: BARNES, No. 242, #5MT, 1944

DRILL: SIBLEY 25", #5MT, 1944

DRILL, RADIAL: CARLTON 3 Ft., 11" col, 1945

GRINDER, CYL: NORTON 10"x18", 1942

GRINDER, INTERNAL: Heald No. 70-A, 1942

GRINDER, SURFACE: MATTISON 14"x16"x60", 1942

GRINDER, TOOL & CUTTER: NORTON No. 2 Universal, 1943

LATHE, AUTOMATIC: POTTER & JOHNSON No. 5D, 1941 (2)

LATHE, AUTOMATIC: SUNDSTRAND No. 8, 1942

LATHE, TURRET: GISHOLT No. 4, Chucker, 1945

LATHE: AMERICAN 18"x72" T.A., 1937

LATHE: HARDINGE 9"x16" Toolmakers, 1942

LATHE: MONARCH 18"x48" T.A., 1945

MILL, PROD: KENT-OWENS No. 1-14, Hyd., 1942

MILL, VERT: CINCINNATI No. 3 Dial Type, 1941

MILL, VERT: KEARNEY & TRECKER No. 3K, 1942

MILL, VERT: KEARNEY & TRECKER No. 3K, 1937

PRESS: TOLEDO 500T Bed: 36"x144"

We have 25 years of experience in supplying the machines you need. Every machine that leaves our shop is guaranteed for first-class service.

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TOOL ROOM AND PRODUCTION EQUIPMENT • SHOP SUPPLIES

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LATHES

14"x54" REED PRENTICE Geared Head Engine Lathe
20"x10' LODGE & SHIPLEY Selective Geared Head
30"x16' bed AMERICAN High Duty Geared Head
42"x15' AMERICAN Heavy Duty Lathe
42"x25' centers AMERICAN Heavy Duty Lathe

GRINDERS

No. 172 HEALD Gap Internal Grinding Machine for large swing
6"x18" LANDIS Type C Plain Grinder
6"x18" NORTON Vertical Spindle Surface Grinder
10"x72" LANDIS Type C Hyd. Pl. Grinder—1942
No. 104 RIVETT Internal Grinder

AUTO LATHES & TURRETS

No. 9188 RIVETT Handscrew Machines
No. 2 B&S Wire Feed Hand Screw Machine
No. 2 B&O Geared Elec. Turret Lathe
No. 1L GISHOLT Saddle Type Turret Lathe, 1942
Nos. 4D & 6B P&J Auto. Lathes

MILLERS

No. 0-8 CINCINNATI Plain Milling Machines
No. 0-8 CINCINNATI (Model OT) Vert Milling Machine
No. 1-8 KENT OWENS M.D. Production Miller
No. 1-14 KENT OWENS M.D. Production Miller
No. 1-18 CINCINNATI Plain Mfg. Miller
Model MM-5 U.S. Multi-Miller
No. 2M CINCINNATI Vertical Miller, 1941
No. 36 VAN NORMAN Plain Ram Type Miller
4½x36" P&W Model C Thread Miller
6"x60" P&W Model C Thread Miller
36"x36"x16' INGERSOLL Planer Type Milling Machine—3 heads
36"x36"x12' INGERSOLL Planer Type Milling Machine—3 heads—late

GEAR EQUIPMENT

Type A BARBER-COLMAN Gear Hobber
No. 64 FELLOWS Gear Shaper
No. 72 FELLOWS High Speed Gear Shaper
No. 12 FELLOWS Gear Shaver, 1943
No. 36BM GOULD & EBERHARDT Gear Rougher

BORING MILLS

No. 0 GIDDINGS & LEWIS Horizontal Boring, Drilling & Milling Machine
No. 32 LUCAS Horizontal Boring, Drilling and Milling Machine
100" BETTS Vertical Boring Mill, 2 heads

WIGGLESWORTH INDUSTRIAL CORP.
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GLEASON #7 HYPOID CUTTER SHARPENER. Ser. #24768. Hand Index, Hand Feed. Coolant.

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with Auto Temperature Control. Sliding door. Cheap to operate. Substantial Dependable for Machine Shop, Tool Room.
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Table 60" wide, 20 ft. long, 36" high from table to cross rail. Direct motor drive—DC current through AC-DC Motor Generator Set. May be seen operating on either day shift or early evening night shift. $9750.00

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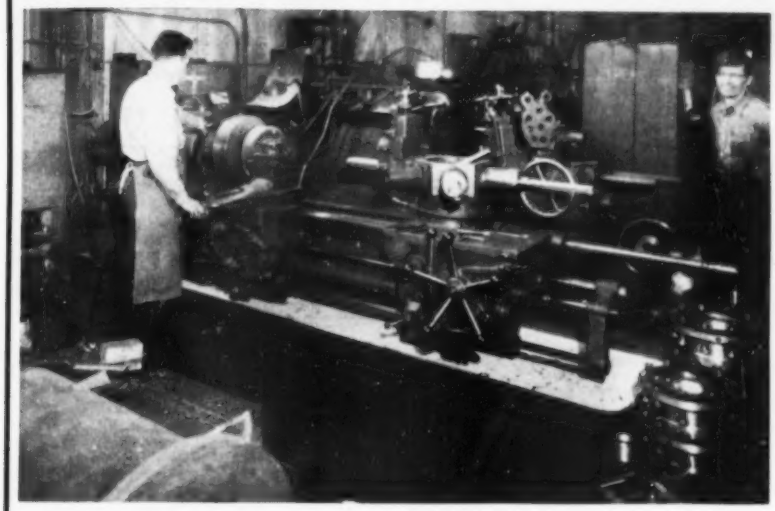

BEHR FACTS:

Milwaukee Crane and Shovel Company, Cudahy, Wisconsin, has found Behrs a reliable source for rebuilt machine tools and industrial equipment. Shown here using a 2L GISHOLT purchased two years ago is operator Paul H. Kott. The machine is still doing an excellent job turning out parts in production.

FIND OUT FOR YOURSELF CHECK THE LIST BELOW:*

LATHES

No. 12 GISHOLT, Aut.
No. 8 SUNDSTRAND, Stub, 1941
Mod. EE MONARCH 10", 1946
14 x 30 MONARCH, 1936
14 x 54 MONARCH, 1937
16 x 54 REED PRENTICE, New
16 x 54 AMERICAN, 1945
16 x 96 REED PRENTICE, 1941
18 x 48 MONARCH, 1942, Ser. #16073

10' x 10' x 25' SELLERS PLANER

TURRET LATHES

No. 2 BARDONS & OLIVER, Elec., BF (2)
No. 2 WARNER & SWASEY, 1939, Ser. #48127
No. 3 WARNER & SWASEY
No. 3 GISHOLT, Univ., BF, 1941-43 (3)
No. 5 GISHOLT, 1941
No. H-5 LIBBY, 1940
No. 1A WARNER & SWASEY, Pre., 1942
No. 2A WARNER & SWASEY, Pre., 1942
No. 3R GISHOLT, 1942
No. 3L GISHOLT, Taper Attch. BF, Cross Slide Turrets, 1936

BORING MILLS

No. 30 GIDDINGS & LEWIS, 3" Hor., W/2 Aux., Ser. #4806
24" BULLARD, Vert., 1940, Ser. #16817

MILLS

No. 2 CINCINNATI, Vert. HSDT, 1943
No. 2 CINCINNATI, Univ. HSDT, 1943
No. 08 CINCINNATI, Vert. Rotary Table
No. 1-12 CINCINNATI
No. 2 SAIMP, Vert., New
24" x 36" INGERSOLL Duplex, 1942
No. 4-48 CINCINNATI Production
No. 2 BROWN & SHARPE, Light Type, 1941
No. 2MH CINCINNATI, Plain, 1941
No. 12 BROWN & SHARPE, Production

GRINDERS

No. 22 HEALD Rotary Surf., 1942
10 x 36 NORTON, Ang., Ser. #16604
Mod. 72A-5 HEALD Int. Surf., Ser. #15279
No. 24-36 BRYANT
6 x 18 Cyl. LANDIS, Plunge Cut, 1943
6 x 30 CINCINNATI, Plunge Cut, 1943

GEAR MACHINERY

LEES BRADNER Spline Hobber
Type A BARBER COLMAN Hobbers (8)
No. 12 GLEASON Rougher, Ser. #19787 & #215790 (2)
Mod. 7125A FELLOWS Shaper, Ser. #19733
Mod. Z FELLOWS Shaper
12" GLEASON Spiral Cutter Sharpener, Ser. #10444

SCREW MACHINERY

1⅞" CONE, 8 Spdl., 1942
2" GREENLEE, 6 Spdl., 1940
Mod. B 2½" CLEVELAND, Late
Mod. A 3¾" CLEVELAND, Late
7½" GOSS & DE LEEUW, 6 Spdl., Aut. Chucker, Work Rotating, 1943

DRILLS

No. 2½ ALLEN MS, PF, #3MT
3'-7" CANDEY OTT, Used Radial
No. 201¼ BARNES, 1948
No. 121 BAKER
No. 321 BAKER
Mod. 242 BARNES, #5MT
Mod. H-3 BARNES, Hydram, 1941
D-13-H NATCO, Multiple Spdl., Hyd.
6 Spdl. EDLUND, HF, 2 Tap Spdl., #2MT

MISCELLANEOUS

BUFFALO Angle & Bar Shear, 12" I-Beams, 8" x 8" 1¼" Angle, 4" sq. Cap., 1944
6"x6" PEERLESS Power Hack Saw, Ser. AX-141
No. 6 MITTS & MERRILL Keyseater

BEHRS REWIND, REBUILD, & REPAIR ELECTRIC MOTORS & CONTROLS

Here is an air view of Joseph Behr & Sons, Inc., showing the yards, railway spurs, warehouses, and offices. Missing is the machinery rebuilding building in another location. There is a total of 11 acres and 286,000 square feet of floor space devoted to Industrial Service to Behr's customers.

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*** This is a small portion of our entire stock. If you do not find your requirements in this list, please let us know. We may be able to help you.**

LATE MODEL MACHINE TOOLS . .

AUTOMATICS
2" Model A Cleveland, 1941
1¾" Model A Cleveland, 1943
1-1/16" Model A Cleveland, 1943
No. 00G Brown & Sharpe, 1941

BROACHES
HP-100 La Pointe Horiz. Broach. 1945

DRILLS
No. C225H Natco Multi. Spdl. 1942
No. 6 Avey 4 Spindle, H.F. 1943
Allen Single Spindle Drill & Tapper. 1942
No. 2 LMS Leland-Gifford H.F. 1942

GEAR EQUIPMENT
No. 7 Gleason "Revex" Hougher. 1943
No. 6 Gleason Revacycle Generator. 1940
No. 72 Fellows H.S. Gear Shaper. 1942
10" Pratt & Whitney Hyd. Gear Grinder. '42.

GRINDERS, CYLINDRICAL
14"x168" Norton Plain Type "C". 1942.
12"x66" Fitchburg Hyd. 1942
12"x18" Cincinnati Univ. Grinder. 1942
10"x18" Norton Plain Type "C". 1940
6"x30" No. 12 B&S Hydraulic. 1940
No. 5 Brown & Sharpe Plain. 1941
No. 2 Cincinnati Centerless Grinder. 1944

GRINDERS, INTERNAL
No. 72-A3 Heald Plain Hydraulic. 1942
No. 24-36 Bryant Hydraulic. 1943
No. 16 CP 16 Bryant Hydraulic. 1942
No. 16-16 Bryant Hydraulic. 1942
No. 172 Heald Hydraulic. Gap. 1940

GRINDERS, MISCELLANEOUS
No. 16A Blanchard Auto. Surface. 1942
Cincinnati Centerless Lapper. 1942
No. 600 UK Hanchett Face Grinder. 1946.
No. 35 Excello Univ. Thread. 1940
HRS Barber-Colman. 1942.

GUN BARREL MACHINES
No. ½ B x 50 P & W Reamer. Latest
No. ½ B x 30 P & W Reamer. Latest
No. ½ B x 50 P & W Rifler. Latest

LATHES, ENGINE
36"x296" American Geared Head. M.D.
30"x153" Safop Gap Bed. Unused
27"x192" Niles Timesaver. 2 Carr. 1941
27"x132" Monarch Auto. Sizing. 1942
27"x96" Niles Timesaver. 1940
20"x 80" Betts Bridgeford. 1940
26"x90" Betts Bridgeford. 1940
10"x20" EE Monarch Toolmakers. 1943

LATHES, PRODUCTION
No. 5D Potter & Johnston Automatic. 1943
8"x84" Lo-Swing Semi-automatic. 1941
Lipe Carbo-Matic Lathe. 1942

LATHES, TURRET
No. 1A Warner & Swasey Saddle Type. 1941
No. 1L Gisholt Universal Saddle Type. 1942
No. 3R Gisholt Universal Saddle Type. 1943
No. H5 Libby Universal Saddle Type. 1939
No. 5 GISHOLT Universal Ram Type. 1942

MILLS, PRODUCTION
M-18 Milwaukee. 1943
No. 1224 Milwaukee Simplex. 1943

MILLS, TOOL ROOM
No. 3 Cincinnati Vertical, M.S. D.T. 1940
No. 3 Van Norman Plain. 1942
No. 2 Snimp Vertical. New
No. 2 Snimp Universal. New
No. 2 M1 Cincinnati Plain. 1951
No. 2L Van Norman Plain. 1942

SHAPERS
16" Gernetti Universal Shaper. New
20" Gernetti Universal Shaper. New
18" Brook Universal Shaper. New
24" Gernetti Universal Shaper. New.

PRESSES
650 Ton Verson Dbl. Act. Eccentric. 1940
No. 166 Toledo Toggle Press.

Partial Listing — Write for latest stock list

INDIANAPOLIS *Machinery & Supply Co.*
1961 S. Meridian St. • • Indianapolis, Indiana

LATE MODEL MACHINES

#2 Warner & Swasey Electric Turret Lathe. Late model.

4"x12" type H Landis Cylindrical Grinder. 1944.

6 DRE Potter & Johnson Automatic Turret Lathe.

Worthington duplex Air Compressor. 665 CFM, 125 h.p. Very little use.

All the above items are in excellent condition.

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NATCO HEAVY DUTY DRILL PRESS

No. B225H

Excellent condition; Late
LATE TYPE MACHINE TOOLS IN STOCK
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SUPERIOR
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Wade-Presdee, INC.

No. 2 B & S High Speed Autos. M.D.
Hardinge Model MD-37 Lathe, ½" cap.
No. 45 Fellows Sharpener.
No. 13 Gleason Universal Tester.

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4357 St. Paul Blvd., Rochester 17, N. Y.

FAIR DEALING PRICES FROM FAIRFIELD

A DEALER OF ESTABLISHED REPUTATION

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#1L Gisholt Universal Turret Lathe (1942)

#4A Warner & Swasey Universal Turret Lathe, Serial No. 418957.

Model 3 Newark Universal Gear Hobber (1943)

FAIRFIELD EQUIPMENT Company DEALERS IN USED REBUILT & NEW MACHINERY

75 SANFORD STREET at R.R.Station Phone FAIRFIELD 9-3321 FAIRFIELD, CONN.

25"/32" x 96" centers AMERICAN Pacemaker Heavy Duty Engine Lathe, taper attachment, chucks, 25 HP AC motor, new 1948.

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Cleveland 250 ton S.S. Press
51x86 bed; 18 stroke, 20 shut height with cushion.

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BROWN & SHARPE Automatics (several)
W.F.F. Double Action Power Presses
#08 CINN. Vert. with Rotary Table
4" RICE BARTON SPLINE MILLER
DIAL FEED POWER PRESSES
SHELL THREAD ROLLERS
30" ESPEN-LUCAS Hydraulic Cold Saw
¼" MANVILLE #1 D.S.S.D. Header
#40 ANDERSON Dial Feed Tappers
#2A WARNER & SWASEY Turret Lathe
Numerous Other Machine Tools

CURRIER MACHINE SALES
1124 Dixwell Ave., P. O. Box 333
Hamden, Conn.

LATE MODEL TOOLS

Model B3B Natco 24 spindle Multiple Drill, adjustable arms, #2 taper, 1944.

#72A Heald Tool Room Plain Internal Grinder, T-base, cross-sliding head, 30" swing.

Natco 3-way Horizontal Drill, with hydraulic cycle

R.A.VINE, Inc.
new and used machinery

652 W. Willis Ave., Detroit 1, Mich.

1—Cincinnati Production Miller serial number 2F1P1L20 $4500.00
1—#1 Cleveland Drilling, Milling and Boring horizontal machine $2500.00
1—Walker-Turner 14" combination wood or metal working Band Saw back geared serial #20842 with ¾ H.P. single Ph. motor $250.00
1—Reid Brothers Service Grinder belt driven #1201 6"x18" DC Magnetic chuck.
1—3 H.P. & 1—2 H.P. 3 PH. Motors 1—DC Generator $450.00
1—Walker-Turner Radio Drill Press ½" chuck with ¾ H.P. 3 Ph. motor Servel Head 120° extended over arm 24" $250.00
1—2'x5' Putman Bros. double belt drive Planer single head. Best offer.
1—2'x10' Fitchburg, single belt drive Planer single head, Best offer

FS-7452, AMERICAN MACHINIST
330 W. 42 St., New York 36, N. Y.

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BALANCERS

GISHOLT 3S Dynetric, 1947.
GISHOLT 12E Static, 1943.

BENDING ROLLS

SOUTHWARK 20'x1" Pyramid Type, Drop End, Balance Bar.

DRILLS

Avey 6-Spindle No. 2MA6 Power Feed, No. 2 MT, 12" Overhang, 1943.
BARNES No. 242 Single Spindle, No. 5 MT, Power Feed, 1941.
BARNES No. 201 Single Spindle, Lead Screw Tapping, Power Feed, 1941.
ALLEN No. 2 MS Single Spindle, No. 2 MT, Power Feed, 12" Overhang.
BAUSH No. 46 High Speed Multiple Driller, 1947.

GEAR EQUIPMENT

BARBER-COLEMAN Model A Gear Hobber, 1943.
FELLOWS 61A Gear Shaper, 1941.
PRATT & WHITNEY 10" Hydraulic, 2 Wheel Gear Grinders (2), 1941.

GRINDERS, CYLINDRICAL

CINCINNATI 10"x36" Plain Hyd. Equipd. for Plunge Grinding, Model ER, 1942.
LANDIS 4"x18" Hydraulic, Plunge Grinding, Auto. Timer, 2 available, 1943.
NORTON 10"x18" Type C Hydraulic, 1942.
BROWN & SHARPE No. 5 3"x18" Plain with Plunge Grinding, 1943.
BROWN & SHARPE No. 5 3"x12" Plain with Plunge Grinding, 1941.

GRINDERS, MISC.

NORTON 6"x18" Hydraulic Surface, 2 available, 1942 and 1943.
HEALD No. 22 Rotary Surface, 12" Chuck, 1941.

JIG BORERS

PRATT & WHITNEY 1½B With Rotary Table and Accessories, 1943.

LATHES, AUTOMATIC & PRODUCTION

POTTER & JOHNSON 5D Automatic Chucker with Air Chucking Equipment, 2 available, 1942.
SUNDSTRAND 12A Automatic Lathe, Air Equipment, 1951.
LODGE & SHIPLEY 3A Duomatic, 1946.
SENECA FALLS Model R-14 Lo-Swing, 1942.
SENECA FALLS Model LR Lo-Swing, complete, 1942.
LeBLOND 13" Rapid Production Lathe, 1200 RPM, 1945.

LATHES, TURRET

GISHOLT 1L Saddle Type Bar and Chuck, 1944.
GISHOLT No. 5 Ram Type Universal Preselector Head, Bar Feed, 1942.
WARNER & SWASEY No. 2 Ram Type, Power Bar Feed, 1941.

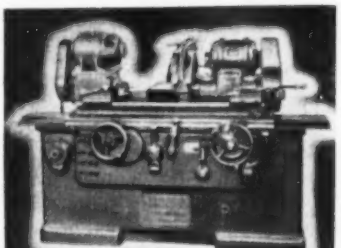
MILLS

CINCINNATI 56-90 Plain Hydromatic.
KEARNEY & TRECKER 2K Vertical, 1943.
KEARNEY & TRECKER 2HL Plain, 1943.
KEARNEY & TRECKER Model 1H—18" Manufacturing Mill, 1941.
U. S. MULTI-MILLER MM-1-5-2 Rise and Fall, 1943.
U. S. MULTI-MILLER MM-1-60, 1944.
No. 3 PLAIN-O-MILL Thread, 1945.

MULT-AU-MATICS

BULLARD 12" 8-Spindle, Type D, with Power Chuck and Tooling, 1941.

SPECIFIC CASES . . .



CUSTOMER PROBLEM

In March of this year an AAAA manufacturer needed a grinder able to hold a .0002" tolerance. Delivery was vital as it was needed for the production line.

MacDELL'S SOLUTION

WITHIN 48 HOURS we had shipped to this customer a 1944 NORTON 6"x18" Plain Cylindrical Grinder, with the .0002" tolerance, at a SAVING OF 46% of the price of a new machine.

. . . TELEPHONE MOnroe 6-7715 . . .

Mac Dell CORPORATION
1042 W. LAKE ST. • CHICAGO 7, ILL.

FINE LATE TYPE GUARANTEED TOOLS

24"x84" centers BOYE & EMMES Heavy Duty Geared Head Engine Lathe, chuck AC-MD.

28"x15' centers BERTRAM (Niles patterns) "Timesaver" Engine Lathe, 2 carriages, rapid traverse, AC-MD, new 1943.

60"x20' NILES-BEMENT-POND Geared Head Engine Lathe, rapid traverse.

No. 3L GISHOLT Turret Lathe, 5-1/16" hole thru spindle, new 1943.

No. 3A WARNER & SWASEY Turret Lathe, 6¼" hole in spindle, bar feed, chuck, tooling, new 1942

No. 2 WARNER & SWASEY Hand Screw Machine, geared head, power feeds, AC motor in base, Timken spindle.

42" BULLARD Spiral Drive Vertical Turret Lathe, Serial 23800, New 1944.

No. 12 BROWN & SHARPE Plain Automatic Production Mill, AC-MD, late type

No. 3-24 CINCINNATI Plain Hydromatic Mill, AC-MD

No. 4 KEARNEY & TRECKER Plain Horizontal Mill, No. 50 taper, motor in base, rapid traverse.

No. 4 CINCINNATI Hi-Power Vertical Mill, No. 50 taper, power rapid traverse, AC motor

No. 2 BROWN & SHARPE Surface Grinder, motor inside base, power feeds.

25A HEALD Rotary Surface Grinder, 24" diameter magnetic chuck, AC-MD.

36" OHIO Dreadnaught Shaper, AC-MD.

1½" LANDIS Bolt Threader, leadscrews, AC-MD.

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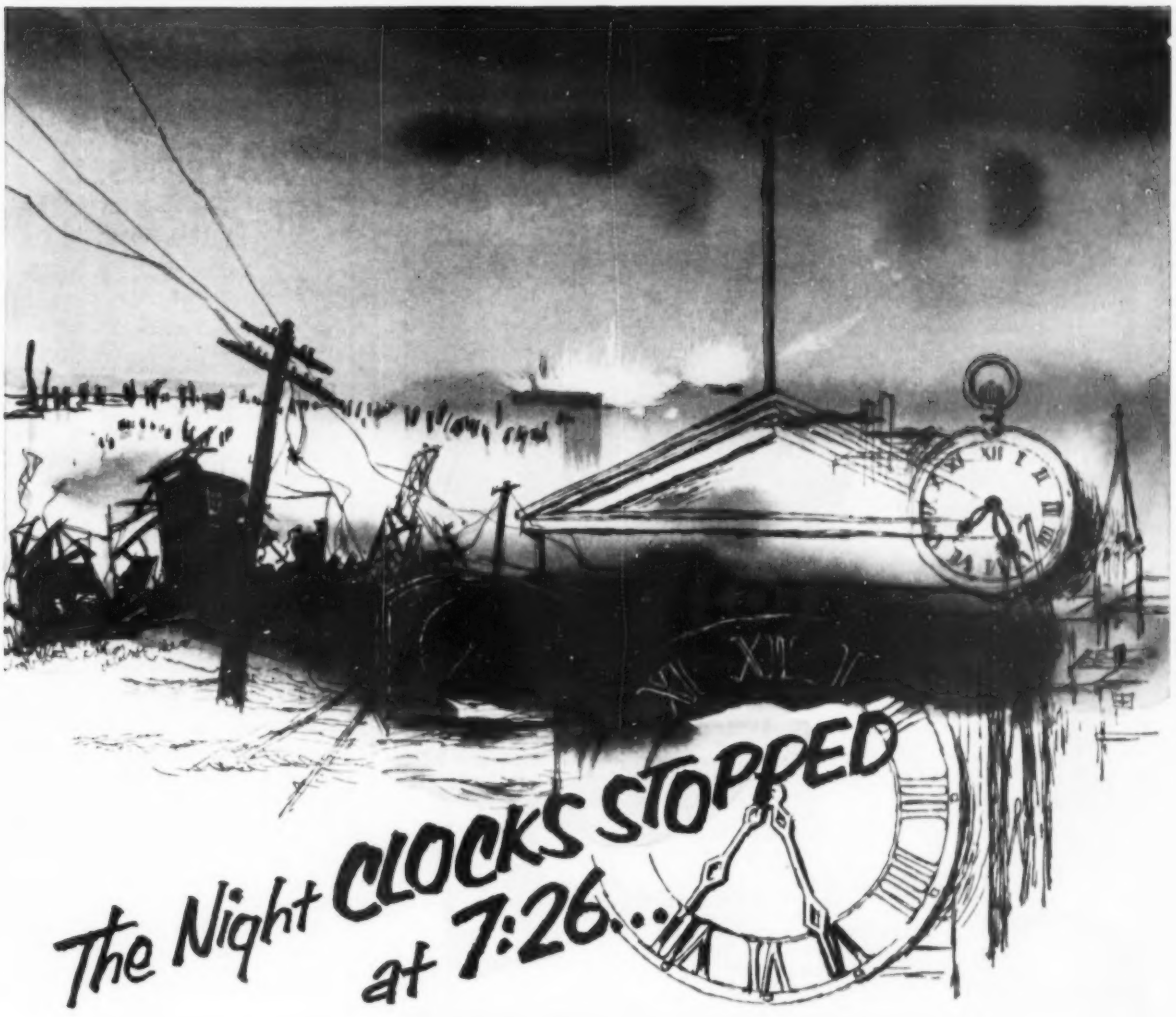

Some 9,500 people were in South Amboy, N.J., that drizzly evening in 1950. At the waterfront, longshoremen were transferring the last of 12 freight cars of ammunition to lighters that would carry it to a waiting vessel in Raritan Bay.

But the City Hall clock never got to 7:27—and the freighter's deadly cargo never got loaded. Explosions shattered windows over a radius of 12 miles; and hundreds of people looked at their arms and legs and saw that flying daggers of glass had stabbed them.

At dawn, 312 of the injured had been counted.

★ ★ ★

Such disasters have happened many times before in America. They could happen again. And *if* they do—and *when* they do—there must be blood plasma on hand to take care of the injured. For blood saves lives!

But blood cannot be mined or manufactured. It must come from the veins of healthy men and women. Men and women who feel concern for a suffering neighbor. So give blood—now!

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Business Executives!

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- ☐ Have you given your employees time off to make blood donations?
- ☐ Do you have a Blood Donor Honor Roll in your company?
- ☐ Have you set up a list of volunteers so that efficient plans can be made for scheduling donors?
- ☐ Have you arranged to have a Bloodmobile make regular visits?
- ☐ Has your management endorsed the local Blood Donor Program?
- ☐ Have you informed employees of your company's plan of co-operation?
- ☐ Was this information given through Plant Bulletin or House Magazine?
- ☐ Has your company given any recognition to donors?
- ☐ Have you conducted a Donor Pledge Campaign in your company?

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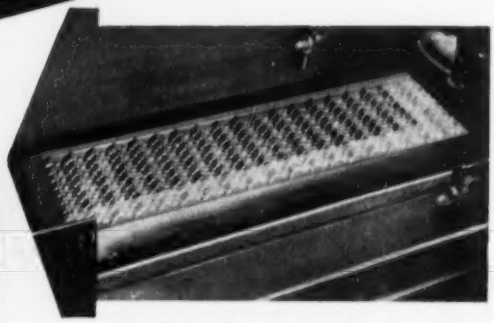
...another reason why SUNDSTRAND Magnetic Chucks are more efficient



Here's an interesting study of why many manufacturers are now using the new multiple pole Power-Grip Chuck to increase grinding production. Installation of a new Power-Grip Chuck provided 40% more holding area than was possible with the equipment of the same size formerly used. In the illustration above the lightened area shows the increase in the work holding capacity of the Sundstrand Chuck.

The illustration to the left shows the closely spaced pole separations which are of .050" wide brass separated by a ⅛" wide mild steel spacer. This design feature coupled with the unusual efficiency of Sundstrand low voltage winding gives uniform holding power over the entire face of the chuck.

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BE MAN enough to stand up and fight for what you say and believe—or don't say it. If you're afraid of the boss, making remarks behind his back won't give you confidence.

BUILD a good reputation in your community. Morale and efficiency usually are high in the plant that is known as "a good place to work."

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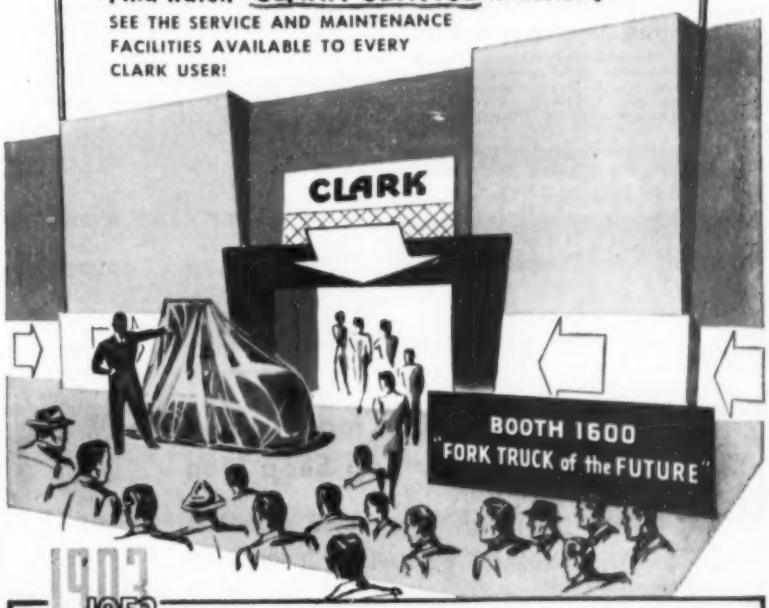

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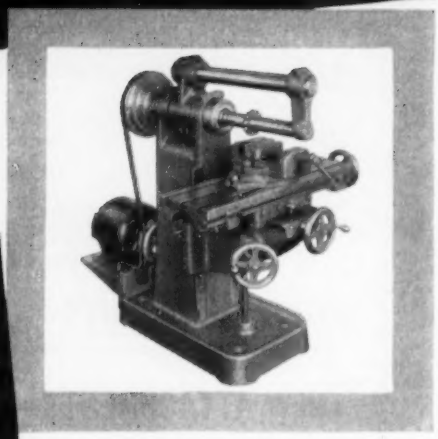

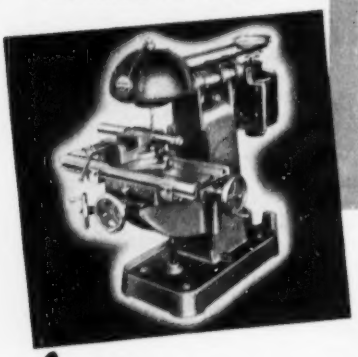

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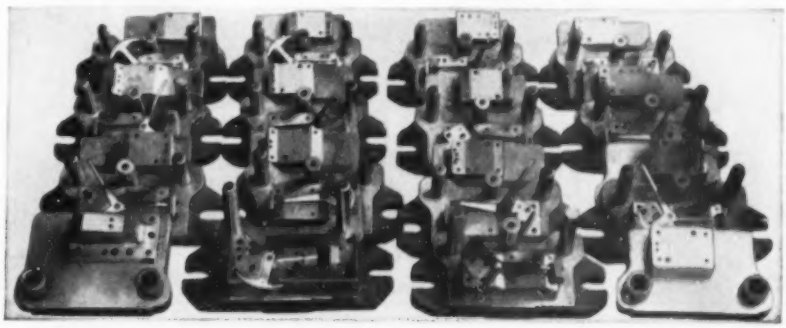

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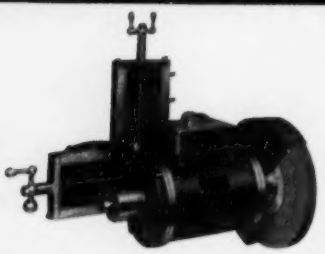

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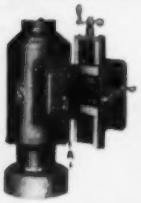

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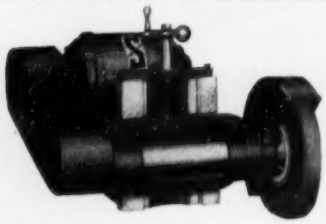
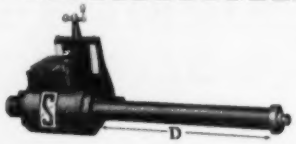
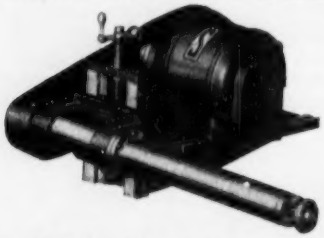


Belt Driven Lathe Grinder. ¼ H.P. to 20 H.P.



Internal Grinder, direct motor drive. Grind up to 30" deep. ½ to 5 H.P.



Belt Driven Internal Grinder. Grind up to 24" deep. ¼ to 5 H.P.

Vertical Spindle Grinder, belted motor drive, ½ to 5 H.P.

B = Adapter to fit in ram of Boring Mill.

Write for Catalog 44

THE STANDARD ELECTRICAL TOOL CO.
CINCINNATI 4, OHIO

From the *American Machinist* Library of *Tips for Top Shop Men*

BE SURE in your own mind why you refuse to consider a new method, a new machine, or a new man. Are you envious because you didn't think of the method, or are you too lazy to work out the change? Are you enamored of an ancient clonker, or are you afraid to meet present standards? Are you jealous of the new man, envious of his youth or experience, fearful of your job?

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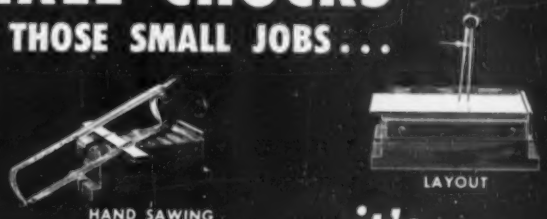
SMALL CHUCKS
FOR THOSE SMALL JOBS...



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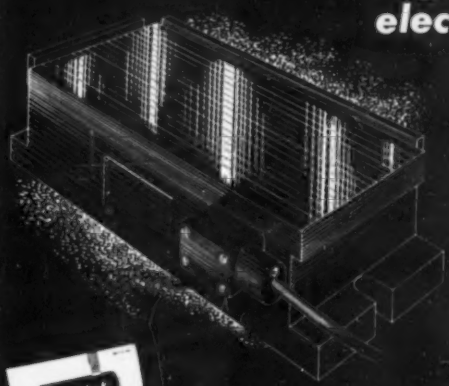
electro-magnetic CHUCKS



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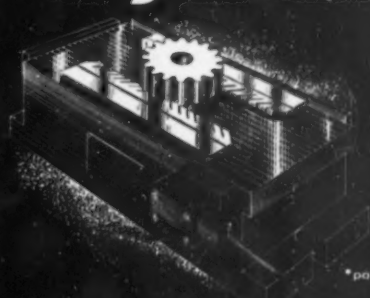

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HIGH SPEED **SPECIAL** RIGHT HAND TAPS

SIZE	THREAD
4	32-48-60-64
5	30-32-36-40-80
6	36-40-48-56-80
7	32-40
8	24-30-36-38-40-44-48
9	24-28-32-40
10	28-30-36-40-48-64
12	20-28-32-36
14	20-24-28
1/16	60-64
5/64	72
3/32	48
7/64	48-56
1/8	32-40
5/32	32-36-40
9/64	36-40
11/64	36
3/16	20-24-32
13/64	32
7/32	24-28-32
1/4	18-24-26-27-30-32-36-40
5/16	16-20-22-27-28-32-40
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HIGH SPEED LEFT HAND TAPS

SIZE	THREAD
0	80
1	56-64-72
2	56-64
3	56
4	32-36-40-48
5	40-44
6	32-36-40
8	32-36-40
10	24-30-32-40
12	24-28-32
1/4	20-28-32
5/16	18-20-24-28-32
3/8	16-24-32
7/16	14-20-28
1/2	12-13-20-28
9/16	12-18-20-24
5/8	11-12-18-20-24
11/16	11-16-24
3/4	10-16-18-20
13/16	16
7/8	9-12-14-18-20
1	8-12-14-16-18-20
1-1/8	7-12
1-1/4	7-12-16-18
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1 11/16	8-10-12-14-16-18-20
1-3/4	8-10-12-14-16-18-20
1-13/16	8-10-12-14-16-18-20
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From the *American Machinist* Library of *Tips for Top Shop Men*

SOME wag said long ago that it isn't smart to step on other men's hands as you go up the ladder—you may need their help coming down. It's just as true that the man who makes his way up by slipping a knife in the back of the man above, spends his time up there ineffectually because he's always got one eye cocked over his shoulder, watching for the knife.

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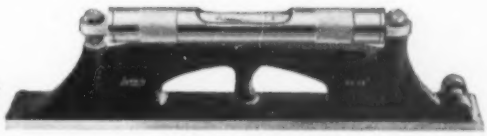

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- Top plate made of a special non-conductive insulating material
- Auxiliary level shows lateral position
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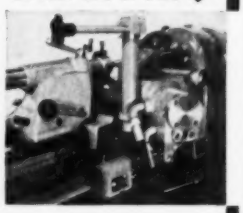
▲ Main spindle

Hydraulic tracer unit on rear side of slide ▼



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From the *American Machinist* Library of *Tips for Top Shop Men*

SLAVERY was not abolished by Lincoln. He did end physical slavery, but man himself must end mental slavery to habit. Education will help, but the real problem is to breed a race of open-minded, inquiring men who welcome the chance to wonder, to question and to analyze—then to take a chance on a new idea that looks sound.

PROCEDURE for methods improvement: Pick an operation to be improved. Put down in writing what happens—the details. Challenge each detail in order. Where a chance for improvement appears, develop the better method. Apply it on the job.

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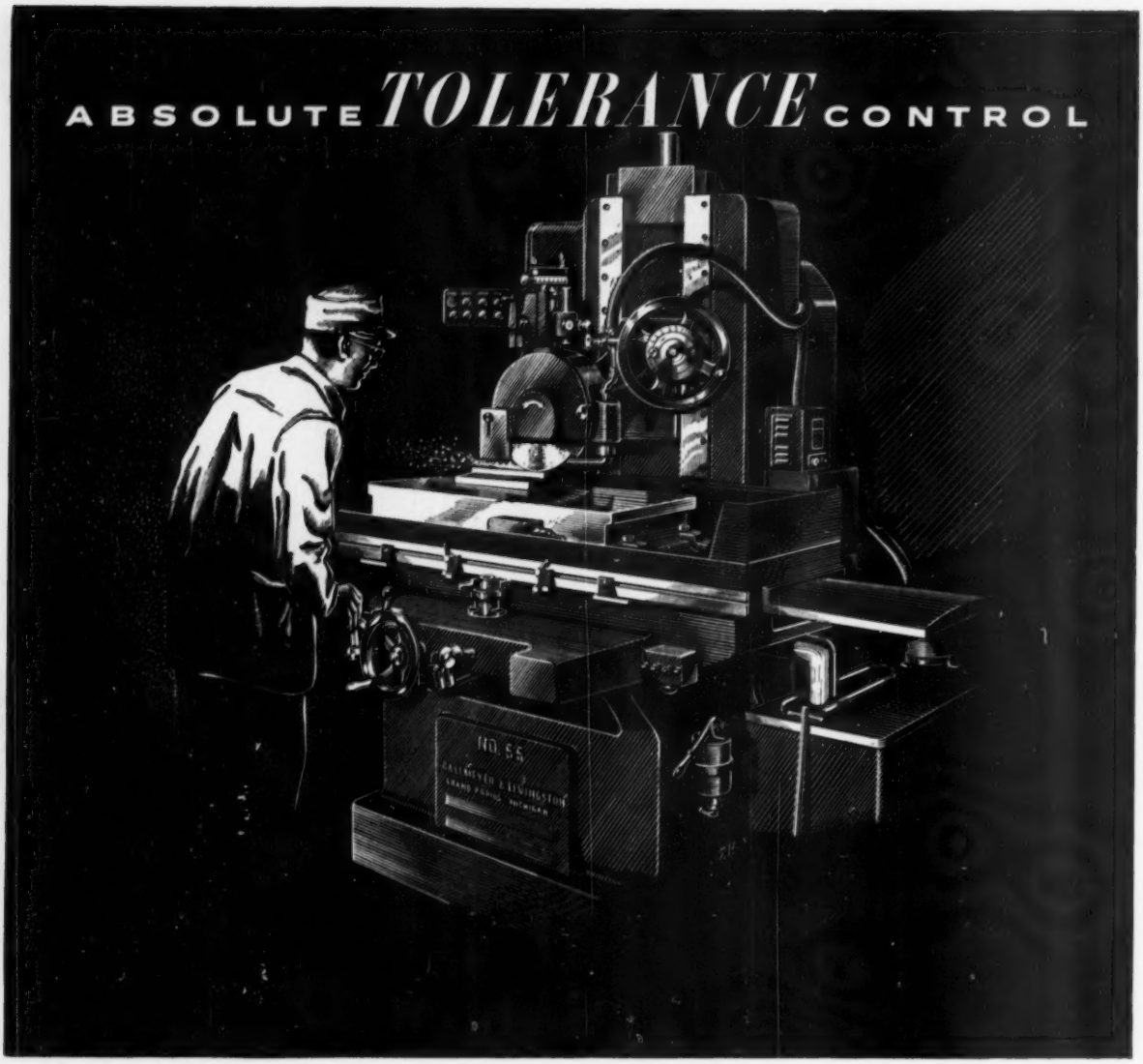

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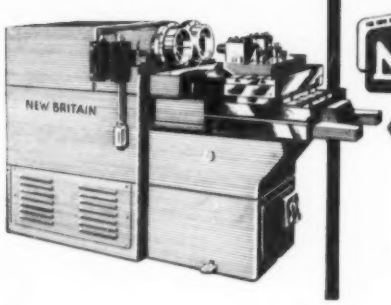

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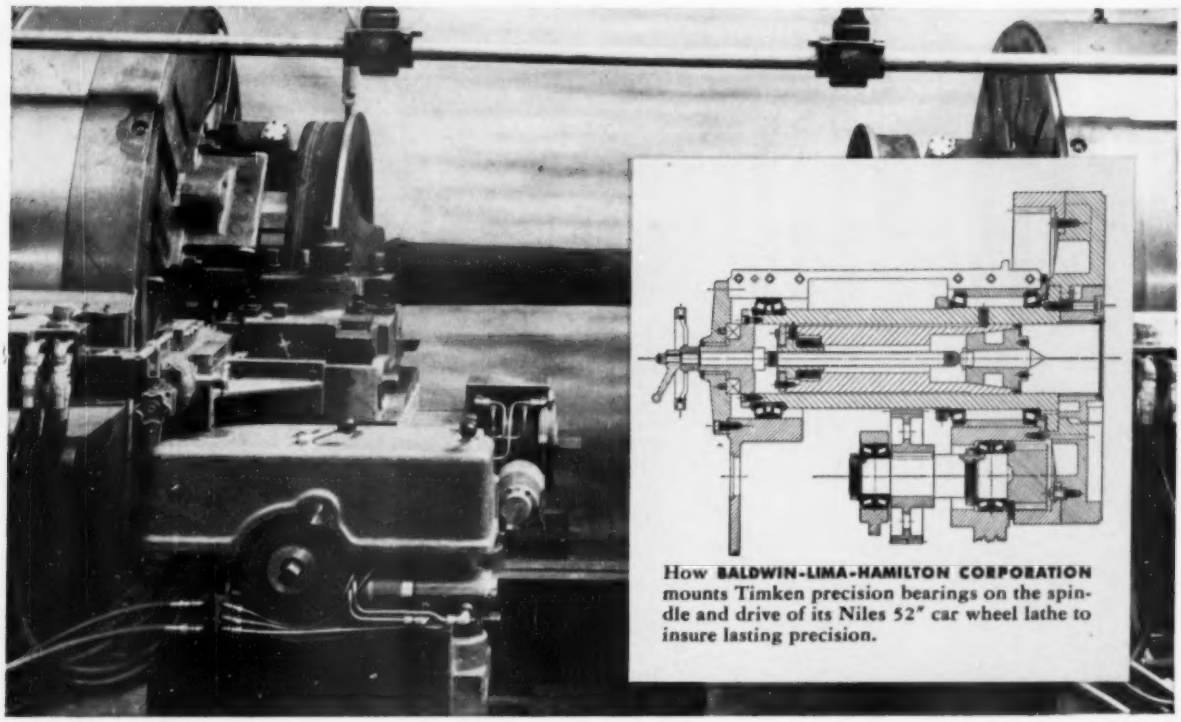

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